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JANUARY, 1860.

ON OXALATE OF CERIUM.

By FERD. F. MAYER, of New York.

This preparation, heretofore a *rara avis* even in a chemical laboratory, is now coming into use as a remedy for obstinate vomiting in pregnancy, for which purpose it has been highly recommended by Professor Simpson, of Edinburgh.* It is

* The drug I refer to is *oxalate of cerium*, which I have seen successful in curing vomiting in a larger proportion of cases than any other single remedy which I have used; and its good effects are not confined to the forms of vomiting which depend on the sympathetic derangements of the stomach caused by changes, functional or pathological, in the uterus or other organs, but are manifested also in those forms of the disease which are due to different morbid conditions of the stomach itself. Cerium is, as you know, one of those rare and little-known metals which were first discovered in the early part of the present century, and is found chiefly in the Scandinavian mines, combined in small proportions in various minerals. I believe that any of the other preparations of the metal would fulfil the indication equally as well as the oxalate, which is used simply because it is the most easily procurable salt of cerium in the market; oxalic acid being used to separate the cerium from the metal with which it is most generally combined in nature, namely, didymium. The action of cerium on the stomach seems to be that of a sedative tonic, resembling in some degree the action of the salts of silver, and bismuth; and I have seen it succeed in curing the most obstinate cases of vomiting so much oftener, and so much more speedily than any other remedy, that I have come of late to have great faith in its employment. I would not lead you to suppose that by the administration of a quantity of oxalate of cerium you will succeed in curing every case of vomiting, or even in alleviating it in every case; but I am certain that you will find the remedy successful in a larger majority of instances than you will find any other one drug. You may give one or two

given in doses of from one to two grains in the form of pills, three times a day, and is said to require but a very few doses to give relief.

It is safe to say that the oxalate of cerium, or any other preparation of this metal, have been seen but by few of our pharmaceutists, and that the formulas for their preparation as contained in the text and hand-books, including Gmelin, will not produce a pure compound, nor is the material from which the metal is to be obtained to be had every day. The latter circumstance, however, does not stand in the way of the introduction of the preparation as a remedy, since the doses used are very small, and the stock now in market will be found sufficient for the period of trial which it will undergo previous to its more general application.

Cerium occurs principally in two minerals, one of them, *Cerite*, exclusively in Sweden; the other, *Allanite*, also in this

grains of it, three times a-day or oftener, in the form of a pill, or mixed with a few grains of gum tragacanth, in the form of a powder. The vomiting usually ceases after a few doses have been taken; but in some cases it does not abate till the remedy has been persevered with for several days. The effect is sometimes instantaneous. I had a patient some time ago from the west of Scotland, and when her husband first came to ask me to visit her I was engaged and could not go, but after hearing his account of the case, I gave him a prescription for cerium pills, which I desired him to administer to his wife till I could get to see her. He came back next morning, asking what the medicine was which I had given him, for the effect of it had been like magic. The vomiting, which had been going on almost incessantly, and which nothing seemed to have any power of alleviating, ceased upon the administration of two doses of the cerium. In a previous pregnancy in this patient it had been made a question for a medical consultation whether abortion should not be induced, to save her from the effects of uncontrollable sickness and vomiting. But the good result is, unfortunately, not always so immediate. One of the earliest cases in which I employed it was in the case of a lady who came from Greenock, when she was pregnant for the fourth time, and had arrived to between the third and fourth months of gestation. For these three or four months she had been always vomiting many times a-day, and often during the night also; and that whether the stomach was empty or full. She could take but very little food, for she always sickened at the sight of it. It had been the same in all her former pregnancies; and on the occasion of the first of them the vomiting was so severe as to bring on a miscarriage, and the patient's own

country, near Bethlehem, Pa., and Monroe, New York. Prof. Silliman, Jr., informs me that he had caused to be collected at the latter place during the past year a notable quantity for Prof. R. Bunsen, who has lately published an interesting paper on the preparation of pure cerium-compounds, as have Vogler and Jegel.* The processes for this preparation are tedious enough to excuse me from recounting the various methods given elsewhere, and I will at once proceed to give what appears to me the most expeditious and satisfactory.

Prof. Simpson does not state expressly whether the oxalate of cerium he uses is that of the protoxide or peroxide; but I judge it to be the former from a sample of the Edinburgh preparation, which, by the by, contains a considerable proportion of lanthanum, a circumstance which may have no bearing on the action of the medicine.

The mineral commonly used, and the one I obtained for this

life was despaired of. She got, first of all, one grain of oxalate of cerium, but vomited three hours afterwards. She was then told to take a grain every three hours for a day, and afterwards one grain thrice a-day. This was successful in checking the vomiting, and a few days afterwards she left Edinburgh, feeling quite well, eating her meals heartily, and free from all sickness. Everything had been tried by different Medical men in the West which afforded any prospect of relief, as creosote, prussic acid, bismuth, lime-water, ice, champagne, opium, blisters, etc., but all without effect. The only thing from which she ever experienced any benefit, and that was only very transient and temporary, was calcined magnesia. Yet, as I have told you, it required only a very few doses of oxalate of cerium to produce a perfect cure. Shortly afterwards I saw, with Dr. Craig, of Ratho, a case of severe and persistent vomiting in pregnancy, where he had tried everything; but in vain. She, too, was cured by a few doses of cerium. When the propriety of entering this and other modern remedies in the new Pharmacopeia to be published by the Medical Council was lately debated, it was objected that so little of the drug is used that it is not worth while classifying it among the other recognized medicinal agents. But on making inquiry lately at the drug shop of Messrs. Duncan, Flockhart & Co., in this city, I was told that they had sold as much as sixty-four ounces during the preceding twelve months, and I feel assured that it only requires to be more widely known to make it more extensively esteemed and employed as a general metallic sedative tonic.—*Med. Times and Gazette*, Sept. 17th, 1859.

* *Annalen der Chemie u. Pharmacie*, Vol. cv. 40, 45; *Chemical Gazette*, 1858, p. 221.

purpose is *Cerite*, a basic hydrated silicate of the cerium-metals, (cerium, lanthanum and didymium,) with small portions of lime, iron, magnesia, yttrium, copper, bismuth, molybdenum, phosphoric acid. The oxides of the cerium-metals amount to 67 per cent. of the whole, that of cerium making up about three-fifths of that proportion.

This silicate is reduced to very fine powder, placed in a comparatively capacious porcelain dish, and with strong oil of vitriol, by the aid of a porcelain spatula or glass rod, formed into a paste. The dish is then put over a lamp or sand-bath, and heated until the mass ceases to swell up and no longer absorbs any oil of vitriol, which latter must be added very cautiously, to prevent accidents. When this reaction is over, and the mass, now a greyish cake, is cooled, it is to be dried and powdered and placed in a Hessian crucible, in which it is exposed to the heat of an anthracite stove-fire, until it has assumed a pale brownish red color. It is now lixiviated with hot water, and subsequently with dilute nitric acid, and the solution treated with sulphuretted hydrogen to precipitate the heavy metals (copper, bismuth, molybdenum). To the clear liquid some hydrochloric acid is added (enough to hold in solution the oxalate of lime, etc.,) and a solution of oxalic acid, which precipitates oxalates of protoxide of cerium, and of oxide of lanthanum, and didymium in form of curdy flakes, soon falling to the bottom as a pale, pinkish crystalline powder. This is washed with warm water, then transferred to a mortar and formed into a paste with one half the weight of the mineral in carbonate of magnesia, which paste is dried on a porous fire-brick, then rubbed fine, and calcined in an open stove until the powder has assumed the color of cinnamon. In this condition it contains all cerium in the form of peroxide, which readily dissolves in concentrated nitric acid, carefully to be added in a beaker, to prevent loss by effervescence, and heated by the water-bath. This solution is freed, to some extent, of the large excess of acid by evaporation in the same vessel, and after due dilution with some water is poured into a vessel containing boiling water to which a little more than $\frac{1}{2}$ per cent. of oil of vitriol has been added. There should be about a quart of water to every ounce of the mineral worked. When the cerium-metals in solution are thus brought together with dilute sulphuric acid,

a yellow precipitate of basic sulphate of the peroxide of cerium— $2 \text{Ce}_2\text{O}_3 \cdot \text{SO}_3 + 6 \text{Aq}$ —is formed, while a little of the neutral sulphate of the same oxide, and all the lanthanum and didymium remain in solution.

The yellow basic sulphate soon settles when the vessel is removed from the fire, and is washed by decantation with hot water acidulated by the same proportion of sulphuric acid. When thoroughly settled, the precipitate dissolves readily in stronger sulphuric acid, forming a yellow liquid which contains only peroxide of cerium. This I reduce to protoxide by digesting it with a few crystals of hyposulphite of soda, of which it takes but little to remove the yellow color of the cerium salt by the sulphurous acid disengaged. The liquid is then filtered and the oxalate of the protoxide of cerium precipitated by oxalic acid, washed with warm water, filtered and dried.

The dilute solution of the cerium-metals in sulphuric acid and the washings from the precipitation of the basic sulphate, retain a considerable portion of per-sulphate of cerium, which is obtained for the greater part by evaporation of the fluids to one-half. If reduced to a less bulk, sulphates of the other metals will crystallize out, which can only be separated by again precipitating a basic persulphate of cerium as described above.

Oxalate of the protoxide of cerium is a snow-white powder, and consists of $2 \text{CeO} + \text{C}_4\text{O}_6 + 6\text{HO} = 46.14 \text{ CeO}$

30.78 O

23.08 HO.

100.00

It is insoluble in water, but dissolves in sulphuric acid, by which it is distinguished from other insoluble salts of the earths, and its solution yields a precipitate with caustic alkalies even in presence of chloride of ammonium, which is not soluble in an excess of the precipitant.

New York, Dec, 1859.

ANALYSIS OF RED SANDAL WOOD.

By H. DUSSANCE, of New Lebanon, N. Y.

(Abridged by the Editor, from an elaborate original paper, at the request of the Author.)

Red Saunders or Red Sandal Wood, (*Pterocarpus santalinus*), is the product of a large tree growing in Ceylon, and on the coast of Coromandel, and well known to druggists as a coloring substance.

Action of water on the wood.—Sandal wood was first exhausted with cold and hot water, by repeated infusions in that liquid; 2.39 gms. lost 0.251 gms. by this treatment. The infusions subjected to distillation yielded a distillate having the odor of musk, due to a volatile oil, and having an acid reaction due to free acetic acid, as determined by distilling its baryta salt with SO_3^2- .

The residuum in the retort was evaporated to dryness and incinerated. It yielded a white ash; the part soluble in water contained carbonate and sulphate of potassa, and the chlorides of potassium and sodium. The part insoluble in water contained silica, sesquioxide of iron, alumina and sulphate of lime.

Another portion of the infusion of sandal wood was examined further for organic proximate principles. It was warmed with hydrated oxide of lead, which removed the coloring matter and free acid. The liquid was filtered and the deposit of oxide of lead, etc., washed.

The clear liquid and washings, by distillation, yielded the volatile oil before noticed. The concentrated liquid was found to contain the *acetates of lime and potassa*, when tested with oxalate of ammonia, bichloride of platinum and sulphuric acid. A portion of it when concentrated became coated with an elastic pellicle, which when warmed with potassa disengaged ammonia, and which afforded a precipitate by solution of galls and acetate of lead. The taste of the concentrated liquid indicates sugar, and when it is thrown into alcohol it is abundantly precipitated, the precipitate being soluble in water.

The oxide of lead precipitate was suspended in water and decomposed by sulph-hydric acid gas, the liquid filtered and boiled. This when concentrated and tested with liquor potassæ, gives a precipitate soluble in hot water. Lime water gives a precipitate; chloride of calcium none, unless the liquid is pre-

viously saturated with ammonia, when a white precipitate occurs. These characters indicate *tartaric acid*.

By subsequent quantitative experiments the proportion of these constituents were determined to be as follows, viz:

2390 parts of red sandal wood exhausted by cold water affords 251 parts of soluble matters constituted thus:

Volatile oil and free acetic acid	46 parts.
Coloring matter,	90 "
Albumen,	9 "
Tartaric acid,	1 "
Sugar and gum,	80 "
Acetate of potassa,	9 "
Acetate of lime,	10 "
Salts, (chlorides, sulphates, &c.,)	6 "

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Action of alcohol on the wood exhausted by water.—Red sandal wood, after exhaustion by water, was dried, and then treated first with alcohol (95 per cent.) cold, and afterward at boiling, till thoroughly exhausted, and the mixed blood red liquids evaporated to dryness. The dry extract digested with water was not affected by it. It was then dried and treated with ether, which dissolved a resinous matter and a little coloring matter. Water precipitates the coloring matter and resin together from the tincture and cold ether separates the resin from the coloring matter.

1986 parts of wood exhausted by water then yielded to alcohol 311 grs. of extract. This was redissolved and treated with a large excess of lead, and the precipitate occasioned well washed with alcohol. The liquors evaporated to dryness yielded 61 parts of resin. The lead precipitate dissolved in acetic acid was diluted with water, which precipitated the coloring matter, and retained the lead in solution. When washed and dried the coloring matter amounted to 250 parts.

Action of hydrochloric acid.—The wood exhausted by water and alcohol was treated with cold hydrochloric acid 15° B. during twenty-four hours, and renewed till it ceased to dissolve. The acid solution was super-saturated with ammonia, which occasioned a precipitate, and which was collected, well washed,

dissolved in hydro-chloric acid, the solution accurately saturated with ammonia and divided into several portions.

Chloride of calcium indicated oxalic acid. Sulphate of magnesia and ammonia indicated phosphoric acid, oxalate of ammonia indicated lime, and the liquid filtered from the oxalate of lime gave with ammonia a precipitate of magnesia.

By subsequent quantitative experiments the author determined the proportion of these salts in 1675 parts to be 50 parts of oxalate of lime, 20 parts of phosphate of lime and 30 parts of phosphate of magnesia, with about five parts of coloring matter left by the alcohol.

Action of fire on sandal wood exhausted by water alcohol and hydrochloric acid.—The wood exhausted by the three preceding processes was decomposed and gave the ordinary products of the distillation of wood, and an *ash*: 1570 parts of the wood gave 29 of ash, consisting of *silica* and *carbonate of lime*, the parts destroyed by the fire amounting to 1541 parts of *lignin*.

It results from the preceding experiments that sandal wood has the following complex composition, viz:

100 parts of the wood contain :

Matters soluble in water,	10.50	parts.
" " Alcohol,	13.97	"
" " Hydrochloric acid,	4.72	
" insoluble,	70.81	
		—
	100.00	

These 100 parts are in detail as follows :

Soluble in water.	Volatile oil and acetic acid,	1.92
	Coloring matter,	3.76
	Salts,	0.25
	Albumen,	0.37
	Tartaric acid,	0.04
	Acetate of potassa,	0.37
	Acetate of lime,	0.41
	Sugar and gum,	3.38
	Coloring matter, alcohol,	11.23
	Resin,	2.74

ANALYSIS OF RED SANDAL WOOD.

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Soluble in hydro-chloric acid	{ Oxalate of lime, Phosphate of lime, Phosphate of magnesia, Coloring matter,	2.24 0.89 1.84 0.25
Insoluble	{ Lignin, Ashes,	69.50 1.81
		100.00

Conclusions.—The author remarks that the coloring matter, which may be called the active principle, is very intimately combined with the ligneous, resinous and saline matters.

The *santalum* of M. Pelletier, he considers to be impure, and to contain resin. The difficulty has been to free it from this substance. The author has obtained *santalum* perfectly definite in its composition, differing in its composition and physical properties from the *santalum* of Pelletier which is used in France under the name of *Vegetable Indian Red*.

The authors results lead him to consider pure *santalum* as a nitrogenous body having close relationship with *indigotin*; it forms similar compounds, sulpho-*santalinic acid*, which is prepared like sulpho-*indigotic acid*, and in this form it can most advantageously be employed by the dyer.

The author proposes to continue the study of *santalum* in a second paper, and believes that plants should be first carefully analysed proximately before their separate principles are clearly studied. He has examined three other specimens of red sandal wood with the following general results, viz:

	I.	II.	III.
Volatile oil and acetic acid,	1.70	1.90	2.10
Albumen,	0.50	0.40	0.30
Sugar and gum,	4.50	3.60	3.20
Coloring matter,	19.00	16.00	21.60
Resin,	2.85	3.00	3.30
Tartaric acid,	0.85	0.00	0.07
Salts,	2.10	4.46	2.03
Lignin,	69.80	70.64	67.40
	100.00	100.00	100.00

ON MONSEL'S PERSULPHATE OF IRON.

BY GEORGE S. DICKEY, JR., OF SAN FRANCISCO, CAL.

To the Editor of the American Journal of Pharmacy:

Dear Sir,—Accompanying this, please find a sample of Monsel's salt, such as I have been making for over eighteen months past.

I give you my formula, the result of numerous experiments when I first undertook its manufacture.

R. Aquæ destillatæ,	ʒlxxx.
Acid. Sulph. Com.	f.ʒix. + fʒiii.
Ferri Sulph. Puræ,	ʒc. troy.
Acid. Nitric. "	f.ʒviii. or q. s.

Mix the water and sulph. acid, and dissolve in the mixture one-half of the sulphate of iron with the aid of heat. Bring up the mixture to a brisk boil, and add the nitric acid little at a time until effervescence ceases, and while still boiling add the remainder of the sulphate of iron little by little, and boil until effervescence ceases. Filter the solution, evaporate to a syrupy consistence and spread on plates of glass to dry. It requires considerable heat to dry perfectly, but is quickly dehydrated by a too long continued heat. When dry, it is necessary to detach it from the plates with a chisel.

The article has attained great celebrity here, principally as a haemostatic and as a local application to venereal ulcers.

I have manufactured and sold more than two thousand (2000) ounces during the last year and a half, and its sale still continues, in fact increases.

I have never yet met an instance of its failure to stop bleeding when properly applied, and it is only necessary that the dry salt should be sprinkled on the wound.

I have been much surprised that it has been so long getting into use in your section, as I sent two or three samples to different parties nearly a year since.

Very truly yours,

GEO. S. DICKEY, JR.*

San Francisco, Oct. 4th, 1859.

*The specimens of the salt received from Mr. Dickey were the finest we have seen; perfectly dry, in very thin scales, translucent and of a light reddish brown color, very soluble and astringent.—ED. AM. J. PH.

CERATUM CANTHARIDIS.

BY WILLIAM R. WARNER.

Take of Spanish Flies, in fine powder,	five ounces.
Alcohol, .817 sp. gr. (95 per cent. vol.)	q. s.
Rosin,	three ounces.
Yellow Wax,	six ounces.
Lard,	seven ounces.

Moisten the powdered flies with the alcohol and pack in a suitable percolator; gradually pour upon it the alcohol until it passes through without much color, which will require usually about two and a half pints. Then evaporate by a gentle heat to the consistency of a soft extract, add the resin, wax and lard, melt them together and, occasionally stirring, maintain at a temperature of 212° for fifteen minutes. Strain through linen to separate the extractive and other insoluble matter that may be present, and stir until cool. This cerate should have a slight greenish yellow hue, of rather firm consistency, and possessing in a perfect degree the active properties of the Spanish flies.

The above formula for Ceratum Cantharidis is offered as a substitute for the officinal cerate from its elegance and greater efficacy, which has been fully attested. Its mode of preparation is not difficult, will, perhaps, afford more uniform results, and the additional expense from use of alcohol is scarcely worth considering, as this, in manufacturing largely, may be recovered by distillation. Slight economy may be practised by the use of hot or boiling alcohol, of which much less is required to exhaust the flies of their active principle. Repeated decocting of the flies in water will afford an aqueous extract which, though containing the virtues of the fly, is not altogether eligible as a substitute for the alcoholic extract in the preparation of this cerate. The heating of the alcoholic extract with the ingredients of the cerate affords a solution of *cantharidin* in the oily matter, and at the same time a separation of the extractive.

According to the researches of Prof. Procter, the active constituent of cantharides in an *isolated* state is sparingly soluble in cold alcohol. In the process here given, however, alcohol is found to be an excellent menstruum, and does readily dissolve the *cantharidin* while it is associated with a peculiar yellow ex-

tractive matter in the fly, as is likewise the case with many other organic principles. Hence it is that though ether is a ready solvent for *cantharidin* and alcohol is not, the latter is a good menstruum for cantharides.

Philadelphia, Oct., 1859.

PRACTICAL KNOWLEDGE.

By JAMES W. MILL.

Pharmacy is defined to be "the art of preparing and dispensing medicines." It is, therefore, the duty of its practitioner—the apothecary—to prepare the medicines which he dispenses. The faithful discharge of this duty would seem to demand that the apothecary himself should make all the medicinal preparations required in his business. This, however, in the present advanced state of the art, is impracticable, since it would require not only more time than the apothecary could well spare from his other duties, but would also involve a much larger expenditure for apparatus than the circumstances of the case would warrant.

There are, nevertheless, a great many preparations, the manufacture of which does not need the aid of costly apparatus, and these the apothecary can, and the writer believes should, make for himself, for example, the solution and acetate of potassa; citrate and ammonia-citrate of iron; citrate of iron and quinia; tartrate of iron and potassa, and such like. The writer believes also that under the guidance of authoritative formula, the skilful apothecary could make his own fluid extracts, which would, doubtless, be much more faithful representations of their respective drugs, than many of those now furnished by the manufacturing pharmacist. The recent very valuable report on Fluid Extracts, by Prof. Procter, at the last meeting of the American Pharmaceutical Association, and the near approach of a new edition of the Pharmacopoeia, give promise, that he will not long be without an authoritative guide in the manufacture of this most important class of medicinal preparations. This is preëminently an age of pharmaceutical progress, and the apothecary who would maintain a respectable position in the ranks, must not only not forget what he has already learned,

but must increase his knowledge. In no way can he more surely do this than by engaging in the actual preparation of the medicines he dispenses. Here his former stores of knowledge are called into requisition—facts, long forgotten, transpire before his eye, and this time fix themselves on his memory not soon again to be forgotten; new phenomena are observed and treasured in the mind—food for future thought; the laws of chemical science are seen silently but surely at work, effecting their wonderful and oftentimes exceedingly beautiful changes and combinations, thus at the same time affording pleasure to the eye and instruction to the mind. It is admitted that many of these preparations can be bought, ready made, of the manufacturing chemist and pharmacist, of good quality, and at a price not much exceeding what it would cost the apothecary to make them for himself; but it is maintained, nevertheless, that the apothecary who makes them for himself will be richly repaid in the abundant stores of real practical knowledge which he will gather from this source; and it is to be remembered that, to the apothecary, knowledge is money. The preparation of citrate of iron and quinia affords a good illustration of the amount of practical knowledge that may be gained in this way. Having, first of all, carefully studied the formula with the remarks appended thereto, the operator proceeds with the first step of the process—the preparation of the sulphate of iron. The sulphuric acid, iron and water, being put together and left to themselves, he will in the mean time have recourse to his Dispensatory, and thence acquaint himself with the nature of the reactions taking place, the various methods of manufacturing the salt, its chemical constitution, tests of purity, medical properties, &c. All reaction having ceased, the liquid is filtered and further treated, according to the directions of the formula, till finally is obtained a mass of beautiful bluish-green crystals of pure sulphate of protoxide of iron. In this process, particularly if he has followed that of the U. S. P., he will have had his attention directed to the great tendency of protosalts of iron, to absorb oxygen from the atmosphere, and consequently to the necessity of protecting them from its influence, as much as possible, in all those preparations wherein a pure protosalt is desired. He will also have witnessed the interesting process of crystallization,

and will, very likely, be led to study out its philosophical principles, the best methods of conducting it, &c.

Having now obtained the necessary quantity of the iron salt, he proceeds to the next step of the process—its conversion into the hydrated oxide. He is, doubtless, a reader of the American Journal of Pharmacy, and therefore will select, as being the most convenient, the process of Prof. Procter for this substance, given in the March number of that Journal for 1853. Here again transpires interesting chemical changes, prominent among which he will note the rapid oxidation of the sulphate of iron by nitric acid, accompanied with the evolution of red, suffocating fumes. In studying the nature of these changes he will, in order to a clear understanding thereof, acquaint himself with the chemical properties of nitric acid and incidentally its history, mode of manufacture, &c. He will also have observed, during the washing of the oxide, that the salt of baryta continued to give unmistakable evidence of the presence of sulphate of ammonia long after the tongue had ceased to reveal it to the taste. He cannot but be struck with the delicacy of this test, and perhaps, as the value of this kind of knowledge becomes apparent to him, it may be the means of leading him to the systematic study of that most interesting and useful branch of chemical science, qualitative analysis. Another fact connected with this substance, which must not be overlooked, is its importance as an antidote to arsenic. He must inform himself of its value in this respect, its modes of administration and the best method of keeping it on hand for cases of emergency. The thoroughly washed and drained magma is now added to a definite amount of citric acid in solution, and the mixture maintained at a certain temperature till the saturation of the acid is complete. Here the reasons for this certain amount of citric acid and this limited range of temperature may be inquired into.

Upon investigation, he will find that experience has proved the solubility of the oxide to be greater within that temperature than any other, and that the proper proportions of the ingredients of all chemical formulæ are regulated by a fixed law, viz.: the law of equivalent combination, by which bodies can only unite in certain invariable proportions. The further study of this subject will introduce him to the knowledge of the atomic

theory of Dalton, by which he is said to have "snatched the science from the chaos of indefinite combination and bound it in the chains of number." He will also have felt the necessity of a more familiar acquaintance with chemical symbols. The next step of the process is the preparation of the requisite amount of quinia. Here it will be necessary for him to calculate the quantity of sulphate of quinia that will yield the desired amount of the alkaloid. This will furnish him with a practical illustration of the value of the law of equivalent combination, with which he had made himself familiar during the preceding process. The extensive subject of cinchona will naturally come in here for consideration, and if a knowledge of botany has not formed a part of his education hitherto he will, now feel the want of it most keenly, and perhaps, to supply this want, he will be induced to undertake the study of a science so pleasing in itself, so refreshing in its influence, and withal so fraught with usefulness and instruction. The quinia having been well washed, is now dissolved in the filtered solution of citrate of iron, evaporated to syrupy consistence, and finally spread on plates to dry. During this final process, he may be led to inquire into the theory of evaporation, the various methods of conducting it according to the objects to be attained, &c; he will also take notice that the salt in drying assumes no definite form, and is on that account classed as an amorphous substance; (in connection with the term amorphous, it may be observed that the comprehension and easy retention of the meaning of scientific terms is greatly facilitated by a knowledge of Latin and Greek; and if the operator be so fortunate as to have had a knowledge of these languages incorporated into his early education, he has reason to be thankful). The process is now brought successfully to its close, and the finished product lies before him, in all its brilliancy of appearance, delighting his eye and exciting within him a feeling of pleased satisfaction at the consciousness of its being the result of his own labor and skill.

The writer has thus endeavored to point out some of the advantages that are derived from the manufacture of one preparation; there are many others, whose preparation is equally productive of valuable knowledge, and it is to be regretted that so few apothecaries take advantage of this cheap and easy method

of instructing themselves in the theory and practice of the higher branches of their art. Books are absolutely necessary, and lectures are useful, but it is only in proportion as the knowledge imparted by them can be utilized, so to speak, that they are of real value to the apothecary. It is an admitted and lamentable fact that many of those now practising pharmacy are totally incompetent to fulfil the responsibilities of the true apothecary. They know nothing of the science of preparing medicine; they have by some means or other learned to distinguish opium from rhubarb, and that by putting so much of this and so much of that together the result will be paregoric; but much further than this their knowledge of preparing medicines goeth not; and yet these men succeed; that is, they make money and block up the field to the exclusion of those who have through long years of tedious preparation qualified themselves thoroughly for the faithful practice of their art. One reason why these men succeed is, the facility with which they can supply themselves with all the medicines required in their business, ready made, at the hands of the manufacturing pharmaceutists. The spirit of a republican government being averse to all restriction of individual freedom in business matters, it will be difficult to devise an effectual legal remedy for this state of things, but the writer would observe, that if the law should require all those who practise pharmacy to make, themselves, the larger portion of the medicinal preparations they dispense, pharmacy would rapidly rise to its proper position amongst the scientific arts of the age.

Chicago, Ill., Dec. 6, 1859.

ON ALUMEN EXSICCATUM.

BY JOHN M. MAISCH.

It is a well known fact, that potassa alum may be decomposed by the application of a high heat, so that sulphate of potassa and the sesquioxide of aluminium are left behind, from which the former may be obtained by long continued washing with water. If the heat is not carried so high, only the water of crystallization is expelled from the alum, and the anhydrous double salt is left behind, which, when in contact with cold

water, slowly combines with the expelled water of crystallization and subsequently dissolves ; this recombination with and dissolving in water is effected in a short time if hot water is employed.

All the Pharmacopœias of this country, as well as of Europe, direct the employment of potassa alum for the preparation of alumen exsiccatum. The directions are in most cases very nearly alike. The alum is introduced into an earthen or iron vessel, or into a dish or a crucible, and heated over the fire till it becomes dry, or till a porous spongy mass is obtained ; or a constant agitation is ordered until vapors cease to be given off. The temperature is not indicated in any of the Pharmacopœias ; the French Codex, however, remarks that the temperature must not be increased to a red heat.

The whole product, as obtained by this process, is allowed to be used by all the various Pharmacopœias, with the single exception of that of Greece. All who have prepared burned alum will have noticed a denser mass on the bottom of the vessel underneath that light spongy salt, which by the aqueous vapors has been puffed up from the upper portions of the fused alum. Now, this dense mass is rejected by the Greek Pharmacopœia, which allows only the spongy portion to be used, probably from the supposition that the former was partly decomposed. There can be no doubt that some care is necessary to prevent such a decomposition on that point of the vessel which is nearest to the fire ; but if the heat is not carried too high, no sulphuric acid will be expelled, and repeated experiments made at different times, have satisfied me that this portion is wholly soluble in water, and is therefore alum, and not a product of partial decomposition by the influence of heat.

If burned alum is well prepared, that is, if only the water has been expelled, it is very slowly soluble in cold water, but dissolves rapidly in hot water. This is an easy test for this preparation, and might be regarded sufficient for proving its having been well made. A number of Pharmacopœias give this behaviour as the requisite test, while no test at all is given by the United States, the various British and the Swedish Pharmacopœias. The Pharmacopœia Badensis, of 1841, has the following tests : It is white, tasteless, at first not soluble in

water, but dissolves after some time when left in contact with the air. The Prussian and the Danish Pharmacopoeias allow a partially decomposed burned alum, for they state, as a test, that it is almost wholly soluble in water.

As far as the taste is regarded, it is true that none is observed the first moment that the burned alum is applied to the tongue; but the presence of moisture there and the heat of that organ almost immediately render a portion soluble, and the peculiar sweetish astringent taste of alum is perceptible. This behaviour is observed with all burned alum, provided that no sulphuric acid has been expelled, in which latter case the tastelessness is soon replaced by the mild saline taste peculiar to sulphate of potassa. Even alum, which by continued exposure to heat has been deprived entirely of its water of crystallization, soon imparts to the tongue this taste. Tastelessness, therefore, is no criterion for the faultless preparation of burned alum; but, on the contrary, is a sign that the heat employed has been high enough to decompose the double salt and drive off a portion of the sulphuric acid.

A mark for the same faulty preparation is a partial solubility. It is presumed that the action of burned alum consists essentially in its power to absorb a considerable proportion of water, after which its astringent powers come into play. If the alum has been exsiccated insufficiently, the former quality cannot be fully developed, and if it has been decomposed by too high a heat, the absorbing power and the astringency have been wholly or partially destroyed. The observance of a certain temperature during desiccation is, therefore, essential; but we possess no experiments which would point out to the pharmacist the necessary precautions to be observed. We have been so far satisfied with the statement of chemists, that potassa alum fuses when heated, and loses its water of crystallization, and that at a dull red heat also sulphuric acid is driven off from the alumina.

Of latter years potassa alum has been scarce, and commanded a high price, and ammonia alum has been substituted in commerce for the former. There can be no doubt that ammonia alum has been extensively used in the preparation of burned alum, and as no complaints have found their way into the journals, it is to be assumed with success. It is a deviation from

the Pharmacopeia, and the question arises whether it is justifiable, from a pharmaceutical point of view, to substitute one for the other. We know that ammonia alum has precisely the same properties as potassa alum; alike as they are in their physical appearance, they are also alike in their general medicinal properties; they both lose their water of crystallization when heated, and absorb it again when brought into contact with moisture. But there is one material difference between the two alums, inasmuch as sulphate of ammonia is decomposed by heat, and ammonia alum, when heated sufficiently high, leaves pure alumina behind.

The difficulty with which potassa alum is obtained now-a-days, makes it desirable to be able to use the ammonia alum in place of it. For preparing hydrate and the various salts of alumina, it is superior to the other, because the sulphate of ammonia, being easier soluble, is more readily washed away with water than sulphate of potassa. But it remained to be ascertained what precautions are necessary for preparing burned alum from the double sulphate of ammonia and alumina. I have, therefore, undertaken some experiments with a view to finding the most suitable temperature for desiccating this alum; and the potassa alum has been likewise employed for some experiments.

Before proceeding to the experiments, I may state here, that they have been performed in a sand bath, heated by an alcohol lamp; the temperature in all cases applies to the sand bath; the alum, the weight of which in each case was six drachms, was fused and desiccated in tared porcelain capsules, and in the case of ammonia alum, moistened red and blue litmus paper was kept suspended over the dish so as to notice any decomposition of the sulphate of ammonia, which at a higher heat is decomposed into water, nitrogen, ammonia and sulphite of ammonia.

1. Ammonia alum was heated to 250° ; after three hours the loss amounted to 2 drachms or 33.3 per cent.; the product was dense and unsatisfactory.

2. Ammonia alum was heated to 350° for two hours; the whole loss was 160 grains or 44.4 per cent. This product was likewise dense, but rather whiter than number one. If all the water had been dissipated, the loss ought to have amounted to 181.37 grs.

3. Potassa alum was fused at 250° ; it soon became tough again, and the heat was therefore raised to 330° ; after two hours, the residue was a coherent, dense mass, weighing, after subtracting the weight of the capsule, 3 drs. 40 grs. It was broken into pieces and heated for half an hour; its weight now was 3 drs. 37 grs.; it was rubbed to powder, and after another half hour its weight still amounted to 3 drs. 34 grs. The fire was now removed, and the capsule left over night in the sand bath; next morning its weight was ascertained to be the same as the night previous; the whole loss therefore was 146 grains, or 40.55 per cent. The product was grey, dense and not satisfactory.

4. Potassa alum was at once heated to 350° ; after two hours it weighed 3 drs. 22 grs. It was now powdered and heated again for the space of one hour, when its weight was ascertained to be 3 drs. 19 grs. The whole loss therefore amounted to 161 grains or 44.72 per cent.; the product resembled the foregoing and was not fully satisfactory. If entirely anhydrous the loss ought to have been 163.36.

The last made burned alum was analyzed for its sulphuric acid; twenty grains were shaken with one ounce of distilled water; after seven hours it was not wholly dissolved yet; the solution was perfect after twenty-four hours, but it contained impurities from the alum, amounting, when filtered off, washed and dried, to one quarter of a grain; if the impurities were evenly diffused through the burned alum, they would amount to $2\frac{1}{4}$ grs. for the whole weight of 199 grs., and prove the alum to be anhydrous.

The alum solution when treated with chloride of barium, yielded a precipitate of sulphate of baryta, which, after washing and drying weighed, 34.5 grs., corresponding with 11.9 grains of SO_3 . 19.75 grs. Al_2O_3 , KO_4SO_3 would contain 12.15 grs. sulphuric acid.

The above experiments, though yielding an anhydrous alum, did not give satisfaction, on account of the product not being light enough, in which state it is generally preferred. Experiments were therefore undertaken at a higher temperature and particular attention paid to the loss. Four drachms of alum were used, and the heat of the sand bath was previously raised to

450° before the capsule was put on. Both alums now were rapidly fused, puffed up, and soon became a spongy mass; by repeated weighing the loss was ascertained. When the ammonia alum had lost 107 grs. or 44.58 per cent., and the potassa alum 106 grs. or 44.166 per cent., the dishes were removed from the fire. The lower portion of both cakes was a rather dense mass, but the greater part was of a porous and light character; the whole was white and unobjectionable in appearance.

Twenty grains of the densest part of the potassa alum was dissolved in water, and precipitated by chloride of barium; the sulphate of baryta, after washing and drying, weighed 35.5 grs., corresponding with 12.24 grs. SO_3 . This part of the alum is therefore anhydrous; for 20 grs. anhydrous potassa alum contain 12.31 grs. SO_3 , yielding 35.7 grs. BaO, SO_3 .

The burned ammonia alum was rubbed to a fine powder; 20 grs. of the same were treated as before, to ascertain the sulphuric acid present in it; it yielded 37 grs. BaO, SO_3 which contain 12.758 grs. SO_3 . Twenty grains of burned ammonia alum which has left a residue of 55.418 per cent. contains by calculation 12.713 grs. SO_3 .

In neither of the above cases, therefore, has there been any sulphuric acid expelled, and it now need scarcely be mentioned that the test paper, suspended over the ammonia alum during the exsiccation, had in no instance been changed.

Crystallized potassa alum contains 45.53 per cent. of water; ammonia alum, besides that equivalent of water which is requisite for the existence of oxide of ammonium, 47.67 per cent. water of crystallization. If we therefore expose either of the two alums to a heat of 450° until they have lost from 44 to 45 per cent. of water, we obtain a beautiful light and spongy product, which contains between 1 and 5 per cent. of its weight of water; and though not entirely anhydrous, answers all the purposes for which burned alum is employed; while on the other hand there is no danger of decomposition from too high or too long continued a heat.

It may be considered unobjectionable if its solution in cold water takes place slowly, but if 6 parts of boiling water dissolve the whole of it in a short space of time.

Philad'a, Dec. 1859.

ON LIQUOR FERRI IODIDI,
AND
ON A NEW COMPOUND OF IODINE AND SUGAR.

By E. FOUGERA, Pharmaceutist, New York and Brooklyn.

The numberless formulas proposed every day by pharmaceutists and manufacturing chemists, are a sufficient proof of the difficulty of preserving the iodide of iron free of decomposition, and also of the non-success of the previous recipes.

In the November number of this Journal, Mr. W. C. Chapman, a gentleman who has made some researches in this favorite preparation, states that he has found no better recipe than the one published by Dr. Squibb, an eminent manufacturing chemist of our city of Brooklyn. The object of this communication is not the discussion of the merits of his article, or of Dr. Squibb's process, but to give a new and simple formula, which does away with all the cautions for filtration, and affords at the same time a beautiful light green liquor of the iodide of iron, very easy of preservation, as can be seen by the two accompanying bottles, marked Liquor Ferri Iodidi U. S.

Since 1856, I have tried, in my leisure hours, to prepare an unchangeable solution of iodide of iron, and was not a long time in finding out that the modus operandi of the U. S. Pharmacopœia was defective, nor that many other recipes published at different times were not much better, since in all of them the combination of the iodine with the iron is effected in the same manner, viz: by throwing all of the iron into the water previously mixed with the iodine. In this first step lies the difference between my formula and those in use.

Every chemist is aware that in chemical combination, a change of temperature will sometimes change the nature of a product. Such may be the case in the preparation of this ferruginous salt.

From all my experiments I have come to the conclusion:

1st. That glycerin has very little, if any, superiority over sugar, for the preservation of the ferruginous liquor.

2d. That the Liquor Ferri Iodidi freshly made, or already undergoing decomposition, becomes entirely unchangeable, by a long exposure to heat, or to the rays of the sun, even if the

bottle afterward be but partly filled, and kept in a dark place. The same result is also obtained by the addition of a few drops of tincture of iodine to the ordinary liquor, and exposure to the heat and sun as above. In proof of this, I forward to you, Mr. Editor, two small bottles, which have served me in my experiments, the one labelled made October 3d, 1857, the other June 3d, 1858; both were exposed to the rays of the sun till January 4th, 1859, when they were taken into the cellar and left there ever since.

3d. That iodine forms with sugar a chemical combination, as it is explained below.

4th. That the liquor of iodide of iron is improved, and rendered more perfect by exposure to the rays of the sun.

I will here mention a formula which I have used for some time with satisfaction; it consists in introducing 4 oz. crushed sugar into a Florence flask along with the water, iodine and iron; when the salt of iron is formed, which is known, as usual, by the light green color of the liquor, it is filtered over the remaining 8 oz. of sugar, boiled and strained as any other syrup. This process of adding a part of the sugar to the first operation, has the advantage of furnishing a sweetened green solution, which can be filtered with as much ease as simple water, without fear of any decomposition.

However good the above formula may be, I have abandoned it for the following:

Liquor Ferri Iodidi U. S.

R. Iodini sublimat. ʒij.

Pulv. Ferri puri ʒv.

Sacchari Albi ʒxij.

Aquæ destillatæ q. s. vel. ʒxiv.

Ut fiat solutio secundum artem.

The iodine is weighed separately in a wide mouth bottle, perfectly dry; all of the iron and about 6 oz. of water, more or less, makes no difference, is introduced into an ordinary bottle, and the iodine added in small quantities (one to two drachms), adding a new portion only when the previous one is combined to the iron. As soon as a portion of iodine is thrown into the iron water, the operator is to shake the bottle continuously until the

metalloid is combined with the metal ; and to avoid the elevation of temperature during the chemical combination, the bottle must be shaken under a stream of cold water, or in a tub of ice water.

When all of the iodine is combined with the iron, which requires only half an hour, the light green solution is filtered, and the filter washed with a sufficient quantity of water to make the liquid measure 12 oz. fluid. To this the sugar is added, the whole raised to the boiling point, and strained. When cold, 20 oz. fluid must be completed with some water, then the liquor is put in a lbj. or 4 oz. bottle, according to the sale. The filtration requires no more than ordinary care, no decomposition takes place, and none of the salt is left on the filter, on which remains only a small portion of the excess of the metallic iron.

The liquor thus made can be kept free of decomposition, in filled bottles, either in the light or in the dark. When the bottles are not full, if kept in the dark, the liquor, after a while, becomes slightly yellowish ; but if exposed in a warm place or to the rays of the sun, its beautiful light green color is restored, and invariably maintained if kept so long enough.

When liquor ferri iodidi is undergoing decomposition, I have ascertained that the decomposition stops at a certain point, and goes no farther, even when placed in an evaporating dish, simply covered with a piece of paper, and left in the dark. Why is this ?

Again, when this same preparation, with or without an excess of iodine is exposed a certain length of time to the heat or to the rays of the sun, it permanently keeps its light greenish color. Why is this also ?

At present I am not fully prepared to answer these two questions, but I may take another opportunity for doing so. However, I may be allowed to say here, that the old theory of the decomposition of iodide of iron, first into protoxide of iron and iodoxydric acid by the decomposition of water, and afterwards the transformation of the proto into the sesquioxide by the oxygen of the air, cannot be admitted here, except *perhaps* when the iodide of iron is in a purely aqueous solution. But granting the correctness of the theory, we would ask why decomposition does not continue indefinitely in saccharine solutions of

iodide of iron, until the whole of it is decomposed into sesquioxide of iron and iodohydric acid?

I will here state a fact, that I have no where seen mentioned, and which I can prove beyond a doubt: it is that iodine unites with sugar to form a chemical combination, which I will call *iodide of sugar*.

This new therapeutic agent, as white and as agreeable to the taste as the simple syrup, stable in its composition, no doubt will some day take the lead among the preparations of iodine. This metalloid, however, has but a slight affinity for sugar; but that they do unite together, the three accompanying bottles marked syrup of iodide of sugar will prove. These bottles contain respectively one, two and four grains of iodine to the ounce by weight.

From this fact I draw the inference, that the sugar, which is the very substance that preserves the iodide of iron intact, is also the cause of its decomposition to a certain point; and from it I deduct my theory, which is, that in the liquor ferri iodidi, the sugar by affinity decomposes a small portion of the iodine and protoxide of iron, and when this liquor is warmed or exposed to the sun's rays, the iodine combines with the sugar to form iodide of sugar, and the protoxide of iron probably combines also with the sugar, or dissolves in the syrup, so as to form a syrup of protoxide of iron.

In the other instance, when to a newly made liquor a slight excess of iodine is added, and the whole exposed to the heat as above, the sugar combines with that small portion of iodine, and its affinity for the metalloid is lessened, so much that it has no more power to decompose the iodide of iron, which will therefore remain permanent.

These two assertions prove conclusively also, that there can be no iodate of iron formed, as has been advanced by some, and that this ferruginous liquor can, and ought to be, kept in the sun's light.

[NOTE.—The above paper was accompanied by seven specimens; four of syrup of iodide of iron, and three of "iodide of sugar," so called. The iodide of iron preparations were thin, syrupy, light green liquids, perfectly transparent. The vials of "iodide of sugar" were nearly colorless solutions of sugar, having an acid reaction. One of them slowly deposited a

white sediment, which, when subjected to Trommer's test, with alkaline oxide of copper, proved to be glucose. The clear solutions, on testing, were also glucosic. On adding a few drops of NO_5 to the dilute syrup, it was colored straw yellow, and smelled of iodine. The syrup, diluted with water, afforded a yellow precipitate with iodide of lead, and a reddish yellow becoming red with bi-chloride of mercury.

The inference is that the iodine exists in the syrup as iodohydric acid, and not as simple iodine, as supposed by the author. When a portion of the solution was heated with sulphate of morphia, and a drop or two of SO_3 , no evidence of the presence of iodic acid was obtained. As the author does not inform us how he prepared the "iodides of sugar" we cannot consider the subject from the point of view desirable. Yet it may be well, in support of the above remarks, to quote from Mr. Gordon's paper on this subject, (Proceedings Amer. Pharm. Associa., Boston, 1859, page 290,) "A solution of iodine in sugar and water, in which iodine is more soluble than water, has a dark red color; sun light changes it to white [colorless?], and no free iodine can be found in the decolorized liquid, and all the reactions show that the iodine has been changed into hydriodic acid."

But, whilst admitting this view, we ask, whence came the hydrogen of the hydriodic acid? from the sugar, or by decomposition of water? If the former, what compound other than sugar and hydriodic acid exists in the syrup? If the latter, what became of the oxygen? We have reason to believe that iodic acid is not present. Does the nascent oxygen react on the sugar to produce saccharic or oxalic acid in minute quantity? As regards the formation of glucose—that has been before observed by Maisch, and especially by Mayer, (see Proceedings Am. Pharm. Assoc., 1859, page 369,) and is due to the action of hydriodic acid just as SO_3 will do it. The brief time incident to passing this paper through the press does not admit of a solution of these questions.—**EDITOR AM. JOUR. PHARM.]**

WEIGHTS AND MEASURES OF THE PHARMACOPÆIA.

By EDWARD R. SQUIBB, M. D.

In the course of a few years' practice with a number of the formulæ of the Pharmacopœia, the writer has been convinced of the inconvenience of the system of weights and measures adopted for the formulæ as used in their necessary relation with the ordinary avoirdupois weights. And from some observations and enquiry into the practice of others, he is confirmed in the opinion that there are reasons of sufficient importance to justify

a change. In giving due thought and attention, however, to so important a matter, the writer cannot agree with those who advocate the change about to be made by the council of British Colleges, nor with those who desire a sudden and more radical change to the French system. At the same time the numerous and great advantages of the decimal system over any other that is practicable, and the rapidity of its advances into general favor and appreciation, seem to indicate that the time is not very distant when it might be adopted with some security of its coming speedily into general use. In view of these circumstances, no intermediate change like that adopted in Great Britain would be advisable, since it is far better to suffer the present inconveniences, than involve the necessity of two changes to reach the desired object.

At the same time it appears to the writer that there is a course by which the disadvantages of the present system might be avoided, and a greater degree of accuracy attained, without the revolution which must necessarily attend the adoption of a new system.

This course is, first, to abolish measures of capacity altogether, and to define quantities by weight alone, and secondly, to substitute the term "parts," meaning parts by weight, for the troy weights, and measures in all the formulæ of the Pharmacopeia.

The principal objection to measures of capacity in an authoritative standard is the want of accuracy in practice entailed by incorrect adjustment and graduation, by differences in reading the measuring line, and by the change of volume incident to change of temperature in liquids. By weighing instead of measuring, these sources of inaccuracy are in great degree avoided, whilst simplicity and uniformity are attained, and costly fragile articles of apparatus are dispensed with, except for prescription uses. Improved accuracy and simplicity would be the main points gained, whilst in convenience and celerity of manipulation very little would be lost.

In substituting parts by weight for both weights and measures the prominent advantage would be that all kinds of weights would be equally applicable, the accuracy of the practice depending upon the ratio alone. The operator may at will

translate the word parts into avoirdupois or troy pounds, or half pounds, quarter pounds, ounces, drachms, grammes, scruples, or even grains according to the quantities needed, or the system of weights he might have, and yet the result would be always the same. While it would give room, if desired, for a recommendation to purchase and use the decimal weights in view of their ultimate adoption.

If the initial number of parts in each formula be placed high enough, all troublesome fractions might be avoided ; whilst upon any scale within the intended limits of the officinal formulæ, the description and manipulation of processes would be quite applicable.

Many arguments of more or less force might be used in favor of such a change, but as they will naturally occur to those who give attention and thought to the subject, it appears unnecessary to detail them.

The strongest objections to the proposed change that the writer has been able to raise, are, first that it is a change from an already established course, and a somewhat radical change involving much labor in remodelling the formulæ, and that the sufficiency of the reasons for making a change may be doubted by some. Secondly, that it involves the necessity of weighing all liquids, including menstruæ, and thus introduces a complication of taking the tare of vessels. In view of the great degree of uncertainty, in measuring such materials as acids, however, this inconvenience would be warranted, whilst that of operating with tared vessels is more apparent than real in practice, since no one who may have applied it in making syrups, solutions, &c., will doubt the advantage in point of accuracy and uniformity of results.

There is nothing very new in such a system, since, in four European Pharmacopœias now in the writer's possession, measures of capacity are not used ; and the method of taking parts by weight, though less common, is occasionally met with in authoritative works. Wherever noticed it always brings to the writer's mind the significance of a simple and universally applicable mode of expression.

These suggestions are published with diffidence, and as suggestions only. They are not advocated or urged with any de-

gree of pertinacity. But from having been applied in the writer's practice with supposed advantage, they are given to attract thought and attention to the subject in advance of the approaching revision of the Pharmacopœia.

As illustrative examples of such an application in practice the formulæ of the following paper are expressed in this manner.

OBSERVATIONS UPON SOME FORMULÆ AND PROCESSES FOR PREPARATIONS THAT MAY BE BROUGHT FORWARD FOR ADMISSION INTO THE PHARMACOPŒIA.

By EDWARD R. SQUIRRE, M. D.

In point of importance, utility and convenience there is probably no preparation that could be introduced into the Pharmacopœia with greater advantage than a well adjusted solution of tersulphate of sesquioxide of iron.

Such a solution should always be kept in readiness for preparing the antidote to arsenic, and might with great advantage be substituted for the crystallized sulphate of protoxide, whenever that salt is used in formulæ for preparations of the sesquioxide, as for instance, in the preparation of citrate of iron, tartrate of iron and potassa, ferrocyanide of potassium, hydrated oxide of iron, and for preparations not officinal.

Liquor Ferri Tersulphatis.

Take of Sulphate of Iron, one hundred and thirty-nine parts.

 = $\text{FeO}_2\text{SO}_4 + 7\text{HO}$, or one equivalent.

Sulphuric Acid, twenty-five parts.

 = $\text{SO}_3 + \text{Aq.}$ or half an equivalent.

Nitric Acid, sixteen parts.

 = 1 part plus the equivalent quantity.

Distilled water, a sufficient quantity.

To forty-five parts of the water, in a basin of the capacity of five hundred parts, add the sulphuric and nitric acids and heat the mixture. Then add the sulphate of iron in portions of one-tenth of the whole quantity, at short intervals, with stirring. When the whole of the salt shall have been added, boil the solution and test it for protoxide by means of solution of ferridcyanide of potassium. Should the test produce a blue instead

of an olive green color in the very dilute solution, add a little more nitric acid and repeat the boiling. Finally dilute the solution to two hundred parts and filter.

The sulphuric acid should be added to the water before heating in order to avoid explosions from the rapid combination, and when the nitric acid is added, if the basin be placed over a lamp or in a water bath the heat will be sufficient to start the reaction, and the sulphate may be added rapidly. The process should be conducted under a hood or in the open air, and if the heating be brisk enough the violent reaction is finished in a very few minutes. If the nitric acid be of the officinal strength, there will not be a trace of proto salt discoverable by the test a moment after the last crystals are dissolved, and the additions of the salt in the large crystals in which it usually occurs is an advantage to the process, because the reaction is then more moderate, and less of the nitric acid is driven off undecomposed in the vapors. The boiling is directed for the purpose of driving off oxides of nitrogen, and to diminish any slight excess of nitric acid. It need not be continued beyond a few minutes, and the whole process, except the filtration, even when ounces are taken for the parts in the formula, may be completed within an hour. The filtration is very tedious, and not always necessary. It need never be applied to any but the last portions of a bottle of the solution, provided time be allowed for the insoluble matter to settle. The testing should be performed upon a single drop of the solution dropped into a test tube half filled with water, and a single drop of solution of ferridcyanide is all that it is proper to add. Great mistakes are often made in the application of delicate tests by using too large quantities.

The process is simple and easy and needs no great degree of skill for its performance, the principal point being so to keep up the heat that the effervescence progresses with the additions of the salt, and does not accumulate till near the end, and then froth over the basin. Such an accident of course vitiates the result.

The writer has used this formula upon the various scales of a quarter of a pound, an ounce and a drachm to each part of the formula and with the same convenience in all.

The resulting solution is a syrupy liquid of a dark, dull brown

color, odorless, but with an acid astringent taste. It has a s. g. of 1.66, and in composition is as follows:

$\text{Fe}_2\text{O}_3 = 80 \times 1 = 80 = 20$	per cent.	{	$\text{Fe}, 14$	per cent.
$3\text{SO}_3 = 40 \times 3 = 120 = 30$	"	$\text{O}, 6$	"	"
$22\cdot22\text{HO} = 9 \times 22\cdot22 = 200 = 50$	"			
$\text{Fe}_2\text{O}_3 3\text{SO}_3 + 22\cdot22\text{HO} = 400 = 100$				

Its known and accurate composition when thus made, and the decimal quality of the figures which express its strength, render it very convenient in practice.

Each part of the solution is equivalent to 0.695 parts of crystallized sulphate of protoxide—or one part of crystallized sulphate of protoxide is equivalent to 1.43885 parts of the solution.

Each part of the solution is saturated by 1.275 parts of officinal liquor ammoniae, or by .85 part of a solution containing 15 per cent. of ammoniae, the commercial ammonia being about this strength, or s. g. .940.

Thus when the hydrated oxide is to be prepared from it, whether for antidote or other purposes, eight parts of the solution—say eight ounces, as about the proper quantity for the antidote, ten and a quarter ounces of liquor ammoniae, or six and eight-tenth ounces of commercial ammonia will precipitate it perfectly. When to be used instead of the sulphate of protoxide, in such a formula as the Ferri et Potassæ Tartras, for instance, '11.51079 ounces is to be taken—or more practically, as there is an excess of sesquioxide provided by the formula—eleven and a half ounces, as the equivalent of the eight ounces of crystallized sulphate of protoxide, directed in the formula.

Another solution of sulphate of sesquioxide of iron, of different composition, has lately been employed in medicine and surgery with effects so well marked, and now so well established here, that there appears to be no doubt of the propriety of introducing it among the officinal preparations. It is the styptic and haemostatic solution of M. Monsel, of Bordeaux. In a paper upon this preparation, by Prof. Procter, in the September number of this Journal, the questions are raised: first, as to whether the salt of Monsel's solution is a definite chemical compound, or a

mixture of two salts already known ; and secondly, whether it possesses any advantages over the normal salt as a remedial agent.

With regard to the first question, the writer believes this to be a new and distinct combination of the acid and base, for the two following principal reasons : Where the dilute solution is precipitated by ammonia, the ammonia being kept always in excess to avoid, as far as possible, the formation of sub-salts, an ochrey, heavy precipitate is obtained, which is almost absolutely insoluble in hydrochloric acid. Again, the reaction with concentrated sulphuric acid, pointed out by M. Monsel, is very characteristic, and, as far as the writer knows, does not belong to either of the salts already known.

Whether its remedial agency is peculiar to it as a sub-salt in contradistinction to the normal, or so-called neutral salt, the writer cannot state from either experiment or observation, but he is decidedly of the opinion that to its minus proportion of acid belongs that peculiar property or quality which renders it so very nearly innoxious and unirritating to the living tissues. He has seen it repeatedly applied, of full strength, to grave wounds without any irritant effect, and it has been repeatedly injected into varicose veins, and been quietly absorbed with the clot, without either local or general irritation.

Within the observation of the writer, in the hands of his professional friends, it has been instrumental in arresting the most difficult and troublesome hemorrhages ; and has been freely used internally, as well as externally, with good results.

Dentists also find it a valuable agent in the practice of their art ; and in the treatment of spongy gums, hemorrhages, &c., it appears to have taken a place hitherto vacant ; and yet in the absence of direct comparative experiment, it would be impossible to assert that a solution of the normal salt would be less effective.

As the formula of the writer differs a little from those of M. Monsel and Prof. Procter, in being more simple and easy, it may be worth while to offer it for trial, adopting for this preparation the name of persulphate, in contradistinction to the normal tersulphate.

Liquor Ferri Persulphatis.

Monsel's Solution.

Take of Sulphate of Iron,	one hundred parts,
Sulphuric acid,	nine parts,
Nitric acid,	twelve parts,
Distilled water,	a sufficient quantity.

Into a tared basin, of the capacity of three hundred parts, weigh in succession, thirty parts of distilled water and the acids, place the basin over a lamp, and add the sulphate of iron. Heat the mixture to brisk ebullition, with constant stirring, and finally add distilled water until the solution weighs one hundred and fifty parts.

If the crystallized sulphate be clean and dry, and the acids be of officinal strength, the quantities given are so nearly exact that the process is easy and the result accurate. If the materials be not officinal, it should not be undertaken without close calculation of their strength.

The addition of the acids to the water in the capsule produces sufficient heat to start the reaction, and the flame of a good lamp, gas burner, or furnace then keeps up and increases the heat as the nitric acid is decomposed, so that nothing is lost by violence of reaction from too much heat at first, whilst the heating progresses as the nitric acid diminishes, so that no troublesome frothing is encountered, and by the time all the crystals are dissolved the liquid will be well heated, and the nitric acid and protoxide of iron will have finished their reaction. The slow solution of the large crystals also economizes nitric acid by controlling the violence of the reaction, while the heat is still great enough to perfect the reaction as it progresses. The subsequent boiling is intended to drive off oxides of nitrogen, and to effect this within practically useful limits it need not be long continued. The whole process should be conducted under a hood to avoid the nitrous vapors. The solution should be allowed to cool before its final adjustment, otherwise the evaporation that takes place whilst cooling would reduce the weight materially.

The resulting solution is a syrupy liquid of a deep, rich ruby or brownish ruby color, very different from the dull reddish brown of the normal solution of tersulphate. It is odorless, but

has a slightly pungent and powerfully astringent rough taste, but the pungency is not of that sharp corrosive acid character that belongs to the normal solution. Its specific gravity is 1.578 by hydrometer. When treated with concentrated sulphuric acid, drop by drop, it is first partially decolorized, and then converted into a white moist solid like plaster paris in the act of setting.

In composition this solution is as follows:

$2\text{Fe}_2\text{O}_3 = 80 \times 2$	$= 160 = 19.185$	p. et.	$\} = 43.166$ per ct.
$5\text{SO}_3 = 40 \times 5$	$= 200 = 23.981$	"	
$52.66 \text{ HO} = 9 \times 52.66$	$= 474 = 56.834$	"	$= 56.834$ "
$2\text{Fe}_2\text{O}_3 5\text{SO}_3 + 52.66\text{HO}$	$= 834 = 100$		Water.

This is not precisely the salt or solution of M. Monsel, because his process does not yield a salt of the composition he gives it. Taking the French Codex as authority for the specific gravity equivalent of Baumé's hydrometer scale, and taking Ure's tables as given by Wood and Bache for the strength of acids, it was determined by calculation that the process of Monsel is deficient in sulphuric acid by 9.936 per cent. to give a salt with the formula $2\text{Fe}_2\text{O}_3 5\text{SO}_3$. Such a minus proportion of SO_3 in his process tends strongly to the formation of a portion of Fe_2O_3 , 3NO_5 , and the writer has found in actual practice with his formula that the prescribed quantity of nitric acid, though in excess by calculation, is not sufficient to peroxidize the whole of the iron, unless the proportion of sulphuric acid be increased. This would appear to indicate that in the absence of a definite proportion of SO_3 , a portion of the NO_5 combines with the excess of base, and is not decomposed by the FeO , SO_3 even on boiling. If sulphuric acid be dropped into such a solution while boiling it effervesces and liberates nitric oxide, as nitric acid would under different circumstances.

The writer has used the original process of M. Monsel, with French weights and measures, and with much care, but could not obtain by it a solution of 45° Baumé = s. g. 1.454, but always a s. g. 1.52. This latter density was also that obtained in the practice of the same process by Prof. Procter.

The writer's process above given yields the compound $2\text{Fe}_2\text{O}_3 5\text{SO}_3$, but the solution is a little more dense than that of M. Monsel, rendered stronger in getting at convenient whole numbers to express the quantity and result. The writer has used this process upon the various scales of half ounce, quarter

ounce, and one drachm to each part, with convenience and advantage, and also on a scale of 33½ lbs. av. of sulphate, but here some modification in the management was necessary.

The late suggestion of M. Monsel, that a small proportion of linseed oil be added to the solution, and shaken with it occasionally during some days, has been tried without any notable advantage, except that when the solution is dried on plates, it renders the salt rather less obstinately adherent to the plates.

The writer has succeeded only with great trouble and loss in making the scales or hydrated solid salt described by M. Monsel, and could never obtain anything like an elegant or easily manageable preparation, in consequence, first, of the sticking to the plates when dry, and next, in consequence of the deliquescent character of the salt. The anhydrous salt is easily and conveniently obtained by painting the solution quickly upon a heated iron plate. When thus managed it dries very quickly in the form of light yellow, spongy, brittle scales, resembling tannic acid. This form is also deliquescent, but much less so than the hydrated salt. In view of the character of these solid forms, it is fortunate that they are not at all important practically, since the solution fulfils all useful indications.

The remaining new preparation proposed to be noticed in this paper is the Pyrophosphate of Iron, in the combination originally proposed by M. E. Robiquet, of Paris.

In view of the chemical character and physical properties of this compound, and influenced by the statements in regard to it made by a Commission of the French Académie, the writer about a year ago, offered it to the medical profession here for trial, and subsequently brought it to the notice of the New York Academy of Medicine. From the first introduction of it here, several hundred pounds of the syrup has been used, with such effect that its value has been established here as a ferruginous tonic. Its advantages over other ferruginous tonics are, briefly, that it does not produce constipation, but commonly an opposite tendency,—that it does not excite the vascular system or produce nausea, headache or tinnitus,—that it is nearly tasteless, and may be easily administered to all classes of patients,—and finally that in common with the Lactate of Iron, and the Tartrate of Iron and Potassa, it appears to be assimilated without decompo-

sition, and consequently without impoverishing or changing the gastric secretions.

The process for its preparation involves a process for Pyrophosphate of Soda.

Sodæ Pyrophosphas.

Take of Crystallized Phosphate of Soda, sixteen parts.

Melt the salt in a porcelain capsule by means of heat, and boil it down to dryness. Collect the dry salt in a sand crucible and expose it to a cherry red heat until it fuses. Finally, when cold, break the crucible, and having collected the fused salt, powder it and keep it in a stoppered bottle. The yield is five and a half parts.

The Phosphate of Soda readily fuses or melts in its water of crystallization, and is easily evaporated to dryness over a gas flame. When nearly dry it should be stirred to avoid loss by splashing, and render it more easily detached from the capsule. The dry phosphate from sixteen parts weighs seven and a quarter parts. The heating in the crucible to drive off the equivalent of basic water requires much care and attention, because, if the heat goes beyond cherry-redness a portion of the salt is decomposed, probably by the silica of the crucible,—the crucible is perforated, and the portion in the lower part escapes into the fire before the upper portions are fused. The writer has repeatedly lost portions of the salt in this way. Cast iron vessels, or crucibles are no better, but are even more easily burned through. The crucible should be heated slowly and with constant watchfulness, allowing plenty of time, and the salt should be pushed down in the crucible as the lower portions fuse. It does not fuse short of a full cherry-red heat. In cooling the salt contracts and becomes crystalline, so that in breaking the crucible it is not very difficult to detach it with a hammer, without disturbing the thin film that lines the crucible. This latter should not be detached, because it is partially decomposed and contaminated with the material of the crucible. The fused salt from sixteen parts weighs five and seven-eighth parts, but by rejecting that portion which is unfit for use, only five and a quarter parts are obtained. As this salt is of difficult solubility it should be kept powdered for use.

Ferri Pyrophosphas.

Take of Pyrophosphate of Soda, four parts.

Solution of Tersulphate of Iron, eight parts.

Citric Acid, two and three-fourth parts.

Solution of Ammonia, six and three-fourth parts.

Water, a sufficient quantity.

Dissolve the Pyrophosphate of Soda in sixty parts of water by means of heat, cool the solution to 50°, and filter it into a bottle of the capacity of two hundred and fifty parts. Then add the solution of Tersulphate of Iron, shake the mixture well, fill the bottle up with water, again agitate it, and set it aside for twenty-four hours to settle. Decant the clear liquid from the precipitate by means of a syphon, and repeat the washing and decantation twice. Then pour the precipitate upon a strainer, drain it for twenty-four hours, and transfer the magma to a tared porcelain basin. Upon the Citric Acid, contained in a suitable vessel, pour the solution of Ammonia, a little at a time, with constant stirring till the crystals are dissolved, and the acid accurately saturated. Then add this solution to the magma in the basin, and apply heat. Stir the mixture constantly till the magma is perfectly dissolved, and evaporate the solution to twenty-four parts and filter it through paper. Finally pour the solution upon plates, dry the salt by a moderate heat, and keep it in well closed bottles. The yield is a little more than seven and a half parts.

The anhydrous pyrophosphate of soda is so difficult of solution that even though in powder it saves time to apply heat for dissolving it. When dissolved in boiling water it readily crystallizes with ten equivalents of water of crystallization, and therefore if the crystallized salt be used in this formula six and three-fourth parts is required, because the crystals contain 40.21 per cent. of water. The solution of the anhydrous salt is always opaque in consequence of phosphates and impurities that are rendered insoluble by the heating, and it therefore requires filtering before precipitation. The proportion of the iron solution is accurately adjusted by calculation and assay, and in practice yields accurate results, without the trouble of filtering and testing to get the point of saturation. If it be deficient in quantity or strength, however, there will be a corresponding loss,

because pyrophosphate of iron is soluble in solution of pyrophosphate of soda,—and if it be in great excess, there is also a reaction involving loss.

With the proportions by weight above given, there is no loss, as was determined by a careful assay of the magma. The resulting precipitate of pyro-phosphate of sesquioxide of iron, $2\text{Fe}_2\text{O}_3 \cdot 3\text{b PO}_5$, is quite insoluble in water, and may therefore be copiously washed without loss. It is in a very finely divided state, and so light that it settles with extreme slowness, so that in twenty-four hours it still occupies one half of the washing bottle. And yet the washing by decantation, as directed, is the most speedy method, because the precipitate so clogs a strainer as to render washing in that way almost impracticable. The washing directed does not entirely free the precipitate from sulphate of soda, but sufficiently for all useful purposes. The magma when drained as directed, having been turned up from the surface of the strainer two or three times in the twenty-four hours, weighs thirty-four parts. Should any accident occur, whereby any portion of the magma is lost, as will sometimes happen, an assay of the remainder should be made by drying and heating a portion of it carefully weighed, to redness, in a platinum capsule, and calculating the true quantity of anhydrous salt, by applying the ratio of loss obtained in the assay to the whole mass. In operating on the large scale, when pounds are taken for parts, the writer always assays the magma in this way, as a matter of precaution, or control. The results obtained in this way are very accurate.

The solution of citrate of ammonia is readily made without water, in the way directed, the point of saturation being attained by means of litmus paper, and the smell of ammonia in the solution. The ammonia should not be in excess, because it decomposes the iron salt and turns the solution brown. If, by accident, much excess is given to the solution, so that it smells strongly of the ammonia, it is proper to drive off the excess by heating before the solution is added to the pyrophosphate. When the magma and solution are put together and heated with stirring, a bright clear olive green solution is speedily obtained, provided the precipitation has been effected with solutions cooled down below 60° . When precipitated at ordinary summer tem-

perature, the precipitate is far less soluble, and when from warm solutions scarcely at all soluble, in the given proportion of citrate. When the solutions are at 50°, the writer has never had the slightest trouble, even with a somewhat smaller proportion of citrate.

The clear solution should be evaporated or boiled down,—for boiling does not injure it at all, until reduced to twenty-four parts, and then filtered through paper. This filtration is brisk enough at first, but the last portions pass very slowly, and it is best to take a new filter for the last two or three parts of solution. It should be poured out in thin layers upon the plates, and if ounces be taken for the parts of the formula, eight large dinner plates will be required for the drying. The dry salt is slightly deliquescent, and hence the direction to keep it in well closed bottles. The formula yields, by calculation, verified by assay, three and sixty-eight hundredth parts of anhydrous pyrophosphate, or if avoirdupois ounces be taken for the parts, the yield of the iron salt is 1610 grains.

The compound salt amounting to a little more than seven and a half parts, is in the form of beautiful yellowish green, or apple green granular fragments or scales looking like crystals. These are a little tough in consistence, but still break between the teeth. It is odorless, but has a pleasant acidulous, slightly saline taste,—almost tasteless. It is thoroughly and readily soluble in water in all proportions, reproducing the bright yellowish green solution, in which solution ferrocyanide of potassium produces only a sky blue coloration, without precipitate.

In composition it is very nearly as follows :—

$2\text{Fe}_2\text{O}_3 =$	$80 \times 2 = 160 = 20.86$ p. c. } = 48.8 per cent.
$3\text{bPO}_5 =$	$71.4 \times 3 = 214.2 = 27.94$ " } = $2\text{Fe}_2\text{O}_3, 3\text{bPO}_5$
$2\text{NH}_4\text{O} =$	$26 \times 2 = 52 = 7.97$ " } = 34.66 per cent.
$\text{C}_{12}\text{H}_8\text{O}_12 =$	$174 = 26.69$ " } = $2\text{NH}_4\text{O}, \text{Ci}$
$13.22 \text{ HO,} =$	$9 \times 13.22 = 119 = 16.54$ " = 16.54 per cent. Water.
$2\text{Fe}_2\text{O}_3, 3\text{bPO}_5 + 2\text{NH}_4\text{O}, \text{Ci} + \text{HO} =$	$719.2 = 100 .100$

Or, expressed approximatively and near enough for memory, the salt consists of one-half pyrophosphate of iron, and one-third citrate of ammonia, thus making the mean dose two or three grains.

Hitherto the syrup of this salt has been almost exclusively used. This is a very elegant, convenient, and, as far as obser-

vation yet goes, a very effective preparation. That first made by the writer was according to the formulæ of Prof. Procter, published in this Journal, and although by no means an elegant preparation, was still found to be very efficient, and it obtained a favor with some practitioners, which it still retains, probably from containing less citrate of ammonia. The more elegant syrup of the formula now to be given has been found to reproduce a tendency to diarrhoea in rare cases of extreme susceptibility of the mucous membrane, as, for instance, in late stages of phthisis and other similar conditions. The dark colored and turbid syrup alluded to, from its minus proportion of citrate of ammonia, probably, does not develop this tendency to the same degree, but still produces the prompt tonic effect. Its use is, however, now limited to this small proportion of cases, and in some hands only. Other practitioners, who observed this effect in the green syrup, and are not prejudiced in favor of the other, use the green in such cases in combination with some astringent.

Syrupus Ferri Pyrophosphatis.

Take of Solution of Pyrophosphate of iron, twenty four parts.

Syrup, two hundred and forty eight parts.

Mix them.

This solution of pyrophosphate is that which results from the first formula after filtration. It forms a beautiful transparent yellowish green syrup without odor, and with only just sufficient saline taste to relieve or correct the flat insipidity of the simple syrup. It is easily taken by the most delicate stomachs, and by children, and has the single disadvantage of being very liable to mould upon the surface. From pretty accurate observations it seems to possess the rather peculiar property of being altogether inert or harmless in cases which do not respond to its tonic effect. The flavoring material used in Robiquet's original syrup is omitted in the writer's process as being injudicious, because delicate stomachs and palates are clawed by constant repetition of even the most delicate aroma, whilst in cases where a flavor is required, it can be added and varied by the prescriber.

Each fluid drachm of this syrup contains one grain of anhy-

drous pyrophosphate of iron, or nearly two grains of the compound salt.

M. E. Robiquet, of Paris, with whom this particular method of using this most soluble and, probably, most available compound of the two popular tonics, iron and phosphorus, published so meagre and indefinite a description of his process of preparation, that those who wished to make it would have to go over the whole ground from the beginning, with much labor and experiment that he might have saved them. The effect of such publications upon those who seek practical information from them, is very much like that of a compromise between legitimate pharmacy and the quackery of proprietary medicines,—that is the preparation is made known with advantages that secure its coming into use for trial, whilst the ambiguous insufficient publication pretty effectually confines the supply to the one source, because few would take the time and trouble to work it out thoroughly.

In the foregoing formula and processes the writer has brought forward some practical illustrations of what he believes would be the great advantages in point of accuracy of manipulation, and results by dispensing with measures of capacity or volume, and substituting weights in the formula and processes of the Pharmacopœia.

The second point, namely, the substitution of parts by weight for the definite weights, is also illustrated, but not so fairly, since the inconvenience of weighing large quantities of menstrua does not occur in these instances.

Nevertheless, in view of the direction in which Pharmacy is advancing toward fluid extracts and saturated tinctures as substitutes for the old dilute preparations, and when percolation is coming into so general and effective use, these circumstances would be less felt.

In the first formula the equivalent number of the principal ingredient, namely, $\text{Fe O, } \text{SO}_3 + 7 \text{ HO} = 139$, is adopted as the indicator upon which the ratio is based, and on close inspection the advantage of equivalent proportion expressed in equivalent numbers will hardly fail to be apparent.

In the second formula, where the same materials are used,

the number 100 is used as the initial upon which to base the ratio, and this gives certain advantages of decimal expression where fractions are involved.

The third formula starts upon a basis that admits an avoirdupois pound of sixteen ounces as an index, and the parts of this and the following formulæ may be read as avoirdupois ounces throughout, with the advantage of starting with a one pound bottle of phosphate of soda, the form in which it is usually bought.

Brooklyn, N. Y., December, 1859.

For the American Journal of Pharmacy.

GLEANINGS FROM THE GERMAN JOURNALS.

BY JOHN M. MAISCH.

Impure Veratria.—R. Kiessling has observed a singular sophistication, probably accidental impurities, of commercial *veratria*, which dissolved in acids with slight effervescence and left on incineration a bluish-green fused residue, effervescent and changing to purple on being moistened with muriatic acid. A quantitative analysis established the presence of a number of inorganic bases, in the following proportions, when calculated as carbonates. 100 parts of this veratria contained

Sesquioxide of iron,	0.20833
Carbonate of lead,	0.36713
“ manganese,	0.62713
“ lime,	0.62500
“ magnesia,	0.23436
“ soda,	3.27340
	5.33535

— *Wittst. Viert. Schr.* viii. 564—567.

Strychnia in Woorara.—A. Oberdörffer, of Hamburg, obtained *woorara* from the Esmeralda Indians of the Amazon river, from the Pevas Indians of the Rio Maranon, and by Dr. Brainard, of Chicago, a specimen from the Orinoco river. By Sonnenschein's method with phosphormolybdic acid, and by Boussingault's method of precipitating the aqueous solution of the alcoholic

extract with tannic acid, &c., he obtained alkaloids, which, by their reactions with chromate of potassa and sulphuric acid, and with nitric acid, established the presence of strychnia and brucia. A complete isolation was impossible on account of the small quantity of the material (Witt. Sch. viii. 568, 569.)

Professor G. C. Wittstein has in an elaborate analysis (his V. Schr. viii. 402-412,) likewise proved the presence of these two alkaloids in woorara obtained from Brazil, but was unable to get them in an entirely pure state, owing to a body of a resinous character obstinately adhering to them.

Dr. Schlosser experimented with this last woorara on living animals. His observations, published in Wittstein's V. Schr. viii. 412-415, indicate the presence of poisonous alkaloids. Paralysis, very rapid pulsation and death by asphyxia were the most prominent symptoms.

A specimen of wood of *Strychnos toxifera*, Schomb., in the Bavarian cabinet of drugs was examined by Professor Wittstein (V. Schr. viii. 415-417.) He exhausted a portion of the bark successively with ether, alcohol, water and boiling water, and found strychnia and brucia in all these liquids; no reaction on starch was obtained.

Schweizer's Cupro-ammoniacal Solution.—For the preparation of a solution of oxide of copper in ammonia, which has the property of dissolving cellulose without decomposition, E. Schweizer employs the basic carbonate of copper. He precipitates a solution of sulphate of copper with carbonate of soda, washes the precipitate well, dries it in a waterbath sufficiently to rub it to a powder, and adds it in a well stoppered bottle to solution of ammonia of .945 spec. grav. Stronger and weaker solutions dissolve less of the precipitate; the subcarbonate of copper is more soluble in ammonia than other basic copper salts, and this may be the cause of its solution being a better solvent for cotton, &c. That the pure oxide of cupro ammonium is the true solvent for cellulose, is best proven by the solvent power of the liquor obtained by digesting copper in ammonia in contact with the air; the addition of a few drops of sal ammoniac favors the reaction very much.—*Schweiz. Zeitschr. f. Pharm.* 1859, 110.

Quantitative determination of certain Metals and Salts.—In the *Jahresbericht d. Phys. Ver. zu Frankfurt a. M.* (Buchner's *Repert.* 1859, 294–297,) Dr. Julius Lœwe publishes researches on the *quantitative determination of silver, lead, mercury, bismuth, and cadmium* in the form of sulphides. The salts, particularly the nitrates, of these metals, when pure or mixed with sesquisalts of iron, yield with sulphuretted hydrogen a precipitate which contains more or less sulphur, the presence of which hinders the calculation of the metals or their oxides from these precipitates. The author, however, succeeds in removing the sulphur by the following manipulation:—The precipitate obtained by a current of sulphuretted hydrogen is collected upon a filter which has been previously well washed with muriatic acid and water, then dried in an air bath of 105° C. (220° F.), and carefully weighed. The precipitate is washed with recently boiled distilled water until the washings cease to reddens litmus paper; by means of a spritz it is then washed into a porcelain dish and slightly heated with a moderately strong solution of pure sulphite of soda. A small addition of hyposulphite of soda appears to be of no disadvantage; on the contrary, the solution of the free sulphur seems to be accelerated thereby. The sulphide, purified in this manner, is collected again on the same filter, well washed and dried at 105° C. in the air-bath. The weight of the metal or the oxide is then calculated in the usual manner.

The same journals also contain a paper by the same author on the *quantitative separation of sulphate of lead from sulphate of baryta*, the former of which is dissolved by a filtered concentrated solution of hyposulphite of soda; heated not over 20° C., (68° F.) in order to prevent the precipitation of sulphide of lead. The sulphate of baryta remains behind; the sulphate of lead may be calculated by precipitating the solution either with sulphuretted hydrogen, with an acid, or with the neutral chromate of patassa; sulphide, sulphate and chromate of lead respectively are thus obtained.

To separate *oxide of copper from oxide of iron* for analytical purposes, by means of ammonia, Dr. Julius Lœwe (see the above named journals) proceeds as follows:—The solution of their

salts is precipitated by an excess of ammonia, the precipitate allowed to settle, the blue copper solution is first filtered, and the oxide of iron then collected upon the same filter. This is washed with hot water until the filtrate ceases to produce a precipitate with ferrocyanuret of potassium, and then washed back into a porcelain dish, there to be dissolved by pure muriatic acid, and again precipitated by an excess of ammonia ; the precipitate is treated in the same manner as before, then dried in an air-bath and incinerated in a platinum crucible ; the previously ascertained amount of ashes of the filter is subtracted from the weight of the whole residue, when the remainder shows the weight of sesquioxide of iron. The amount of copper is ascertained by evaporating from the filtrate by means of a water bath the excess of ammonia, acidulating with muriatic acid, precipitating the copper with sulphuretted hydrogen, washing and oxidizing with nitric acid so as to obtain it as oxide of copper.

Tartrate of Baryta.—Dr. A. Vogel, jun. and Dr. C. Reischauer have published in Buchner's *Repertorium*, 1859, 337–348, researches on *tartrate of baryta*, the results of which are as follows :—This salt exists in an amorphous and in a crystalline state ; when freshly precipitated, it is flocculent and amorphous, but soon changes into the crystalline modification which rapidly subsides in heavy granular crystals. A characteristic difference between these two modifications is their solubility in water, the amorphous tartrate dissolving in 83, the crystalline in 1300 parts of water. The flocculent precipitate in solution of baryta by tartaric acid, or in chloride of barium by tartrate of potassa, may be dissolved in the requisite quantity of water, from which solution, on standing, the crystalline tartrate of baryta is separated.

Preparation of Bromide and Iodide of Potassium.—Professor Dr. A. Buchner has proposed the following formula for the second edition of the new Bavarian Pharmacopœia :—2 oz. iron filings and 18 oz. of distilled water are mixed in a flask with 3 oz. of bromine gradually added, and agitated until the liquid has assumed a greenish color, when it is filtered, and the filter washed with distilled water. This liquid is added to a solution of 1 oz.

bromine in a sufficient quantity of diluted caustic potassa; most of the iron is then precipitated with caustic potassa, and the precipitation of the heated liquid is completed by the careful addition of a solution of carbonate of potassa. After standing several hours, the precipitate is filtered, washed with distilled water, evaporated and allowed to crystallize as long as pure crystals are formed, which are to be quickly washed with a little cold water and dried.

For *iodide of potassium*, the formula is like the preceding, except that for 2 oz. iron, 36 oz. water and 6 oz. iodine, and for the second solution 2 oz. iodine are employed. The author proposes, after Liebig's suggestion to dissolve, instead of one-third, one-fourth of the whole iodine or bromine employed, in the caustic potassa, in order to precipitate, not hydrated sesquioxide, but the magnetic oxide of iron, which is less voluminous, and therefore more easily washed.

On the decolorization of a solution of Indigo in sulphuric acid by volatile oils.—C. Frederking, of Riga, gives the following information in a letter to Dr. Bley, published in *Archiv d. Pharm.* 1859, Sept. 289, 290. The solution of indigo was decolorized by oleum aurantii, anethi, angelicæ, cassiæ, limonis, menth. pip. Amer., menthae crispæ, lavandulæ, juniperi baccæ (commercial), sabinæ, salviæ, saturejæ Portug, terebinth. It was not decolorized by oleum anisi, caryophylli, carvi (self-prepared), bergamottæ, ceræ, calami, cajeputi, fœniculi, hyssopi, menth. pip. Germ., origani, junip. bacc. (self-prepared), petroselini, serpylli, rosmarini, petræ, thymi, valerianæ. One-tenth oil of turpentine added to oil of valerian and oil of juniper of his own preparation, decolorized the solution of indigo. It appears that some oils may be tested for turpentine in the manner indicated.*

On rectifying 12 lbs. chloreform, C. Frederking obtained, to-

* M. Frederking does not appear to have met with the observations of Dr. J. T. Plummer "*On the discolorizing properties of the essential oils*," Amer. Jour. Phar., 1853, page 398; and also at page 408 of the same volume, in a paper entitled "*Experiments with sulph-indigotic acid and ozonous atmospheres*." The reader will find this subject interestingly treated of in these papers six years before M. Frederking was attracted to the subject.—ED. AM. JOUR. PHAR.

wards the end of the distillation, $\frac{1}{2}$ oz. of a liquid of the spec. grav. of chloroform, but having the odor of valerianate of oxide of amyle; it was probably formed by the oxidation of the fusel oil of the alcohol.—*Archiv d. Ph.* 1859, Aug. 149.*

Oxidation by Chromic Acid.—Frederking (*Arch. d. Ph.* 1859, Aug. 150,) has observed, that all carbohydrates (sugar, starch, &c.) are decomposed by chromate of potassa and a sufficient quantity of sulphuric acid, into carbonic acid and water. Oxalic, tartaric, citric and other polybasic acids are likewise oxidized by this reagent; the carbon is calculated from the carbonic acid, the oxygen of which is deducted from the whole amount of oxygen given off by the chromic acid; the difference has been used for the oxidation of the hydrogen; the weight wanting on the whole substance is oxygen. Acetic, formic and monobasic acids in general yield no carbonic acid.

ON THE CRYSTALS IN THE BARK OF GUAIACUM.

By DR. OTTO BERG.

A large number of very small, colorless, and bright crystals may be observed by means of a magnifying glass, upon the inner surface of the bark of guaiacum, which therefrom receives a peculiar lustre. Guibourt declared them to be benzoic acid. Richard and Trommsdorff, however, crystallized resin of guaiacum, of which the bark contains about 2.5 per ct. In Liebig and Woehler's *Handwoerterbuch*, there is a paper on guaiacum by Dr. Städeler, who thinks it not improbable that the crystallized body might be the guaiacin, observed by Landerer in the sediment of a tincture of guaiacum. I have pointed out this error already in the first edition of my *Pharmacognosy*, where I stated that these crystals were of inorganic nature, and nothing else but gypsum. Later works, however, have repeated those old assertions, and I feel myself thereby induced to enter in this place more into details on this subject.

These crystals are found not only upon the inner surface of the bark, but are evenly distributed throughout the whole inner

* The same substance was noticed in chloroform by Mr. Henry Pember-ton, see *Amer. Jour. Phar.*, 1853, page 113.—EDITOR.

portion, and may therefore be readily recognized upon the thin lamellæ into which the bark may be split after a short maceration in water; each of the cells of the parenchyma, which are placed in very regular rows, contains a single crystal which occupies nearly their whole interior.

From thin longitudinal cuts, some of the crystals may be easily separated by ablation, and on rolling them about under the microscope, they are easily recognized as four-sided prisms, and as twin-crystals of the same size. The presence of these so-called swallow-tailed crystals led to the supposition of their being gypsum, and this was verified by the micro-chemical analysis.

If the crystals are heated, they assume a milk-white color, which is characteristic of the crystals of sulphate of lime. A similar change, under somewhat different conditions, may be observed, if a very thin longitudinal section of this interior bark in a tangential direction is incinerated. If it is carefully moistened with water, it will be observed that the crystals have changed their color to a milk-white, but have remained in their respective positions. Reduced to sulphide of calcium by the carbon of the cellulose, they are dissolved with effervescence on the addition of nitric acid, and the evaporated solution again yields prisms of sulphate of lime in star-like groups, but considerably smaller in size.

The same twin-crystals of gypsum are likewise found in the inner bark of other plants; for instance, in the bark of *Swietenia Senegalensis*, and in a somewhat different shape in the bark of *Pterocarpus Massupium*. The crystals of gypsum in the parenchymous cells of the various species of *Musa* are of various shapes, and are always found in a larger number in the cells, which are never entirely filled by them.—*Archiv d. Pharm.* 1859, August 155, 156.

BOTANICAL AND PHARMACOLOGICAL INQUIRIES AND
DESIDERATA.*

BY SIR WILLIAM J. HOOKER, K. H., &c.

Director of the Royal Gardens of Kew:

ASSISTED BY

DANIEL HANBURY, Esq., F. L. S., &c.

Botany is a science which requires to be studied at home as well as in the field. For this reason it is highly desirable that persons visiting a foreign land should not only obtain information on the spot respecting its plants and their uses and properties, but that they should transmit to this country ample collections of *well-preserved specimens*. These may consist of *living plants* or of *pressed and dried botanical specimens* and of *fruits* and *seeds*, also of various vegetable products. By the last term we mean such objects as *medicinal substances* (barks, roots, gums, resins, and the like,) *dye-stuffs*, useful *fibres*, interesting *woods*, *oil-seeds*, with the oil prepared from them, *farinaceous substances*,—in fine, whatever of vegetable origin deserves attention on account of its utility to man.

Let us therefore offer in the first place a few plain instructions for collecting and transporting plants in foreign lands.

Living Plants for Cultivation.

Plants for cultivation in our European gardens may be introduced either as *seeds*, *bulbs*, *tubers*, *cuttings*, or *rooted plants*.

Seeds, bulbs, and tubers are easily collected, and as easily

[*To promote the acquisition of information by travellers, the article "Botany," extracted from the Admiralty Manual of Scientific Inquiry, 3d edition, 1859, has been published in pamphlet form, comprising instructions for the collection and preservation of specimens, together with notes and inquiries regarding botanical *materia medica* subjects. A copy of this has been sent to us by Mr. Hanbury, with the request to publish such parts of it as will facilitate the object in view. There are several gentlemen in the Medical corps of the U. S. Navy, and among its officers, of whom Dr. Ruschenberger and Capt. Page are examples, who have availed themselves of the excellent opportunities sometimes afforded during the cruising voyages of the national vessels, in prosecuting inquiries of this kind, and we hope that these inquiries will attract the attention of some of those gentlemen.—EDITOR AM. JOUR. PHARM.]

transmitted to Europe from very distant countries. The first, *seeds*, require to be gathered quite ripe; to be wrapped, a quantity of each, in dry and not absorbent paper, done up in a parcel, and kept, if possible, while on board ship, in an airy part of the cabin. *Bulbs* and *tubers* should be taken up when the foliage has withered; and, if well dried, they may be packed in the same way as seeds.

Cuttings.—Generally speaking, it is vain to attempt sending *cuttings of plants* to a distance, for they soon perish; but this is not the case with the greater number of *succulent* plants—those with thick and firm fleshy stems and leaves. Such are many of the *Cactus tribe* in South America; the various succulents of South Africa, as *Aloes*, *Euphorbias*, *Stapelias*, *Mesembryanthemums* or *Fig-Marygolds*, the *Houseleek* kind, &c. Many of the *Bromelia*, or Pine-apple tribe, and the *Agaves* or *American Aloes*, will survive a long time as cuttings. The cuttings should be taken off, if possible, where there is a contraction or articulation of the stem, or at the setting on of a branch. The wound ought to be dried by exposure to the sun; and the cuttings may be packed in a box, with paper wrapped about them, or any dry elastic substance to keep them steady.

Rooted Plants.—Some few of these, namely, such as are of a succulent nature, small plants of *Cactus*, *Aloë*, *Bromelia*, *Tillandsia*, and *Zamia*, &c., and (which are now highly valued in European stoves) the various *Epiphytes* or *Air-plants*, those numerous *Orchideous plants* and others of the *Arum tribe*, which clothe the trunks and branches of trees in tropical countries:—all these will bear a long voyage if removed with their roots and stowed in a box, like the cuttings above described, the larger kinds surrounded with dry straw. But plants, in general, when taken up with their roots (and young ones should be preferred,) can only be securely transported, placed in earth, in Ward's plant-cases, now generally known and most deservedly esteemed: these cases are glazed at the top or roof, so as to be in fact small portable greenhouses. The plants should be established in the cases some days before sending them off, secured by splines, so as to confine the roots in the soil in the event of the box being overturned, and moderately watered. The lid is then fastened with putty and screws; and the case being placed on the deck

of a vessel so as to be exposed to the light, which is an indispensable requisite, will require no watering nor any attention (unless the glass happens to be broken) during the entire voyage.

On Preserving Plants for the Herbarium.

This is by no means the difficult process which many have imagined. The object is to prepare the specimens in such a manner that their moisture may be *quickly absorbed*, the colors, so far as possible, preserved, and such a degree of pressure imparted that they may not shrivel in drying.

For these purposes provide a quantity of paper of moderate folio size and rather absorbent quality—brown or stout grey paper answers the purpose exceedingly well. An excellent kind, when not to be used in a hot and moist country, is *Bentall's botanical paper*, 16 inches by 10, which costs (folded) 15s. a ream; or of larger size, namely, 20 inches by 12, 21s. per ream. It is sold by Newman, No. 9, Devonshire Street, Bishopsgate Street, London. In a hot and moist region, brown paper may be employed with advantage. Two boards are requisite, of the same size as the paper, or a trifle larger, one for the top, the other for the bottom of the mass of papers. Some pieces of millboard placed between the specimens, if these are numerous or particularly thick and woody, are very useful. For pressure nothing is better than a heavy weight on the topmost board, or, while travelling, three leather straps and buckles, two to bind the boards transversely, and one longitudinally. Thus provided, gather your specimens, if the plant be small, root and stem; if large, take off portions of the branches, a foot or rather more in length, always selecting those which are slender and in flower, or in a more or less advanced state of fruit. Long slender plants, as *grasses*, *sedges*, and many *ferns*, may be doubled once or twice. Place them, as quickly after being gathered as you can, side by side, but never one upon the other, on the same sheet of paper, taking care that one part of the bundle be not materially thicker than the other; and lay over the specimens one, two, three, or more sheets of paper, according to the thickness of your paper, and of your plants; and so on, layer above layer of paper and specimens, and subject the whole to pressure. In a day or two, according to the more or less succulent nature

of the plants and the heat and dryness of the climate, remove into fresh papers, twice or oftener, till the moisture be absorbed, and dry the spare papers in the sun or by a fire for future use.

If the specimens cannot be laid down as soon as gathered, they should be deposited in a tin box, which indeed is essential to the botanist when travelling ; there they will remain uninjured for a day and night, supposing the box to be well filled and securely closed to prevent evaporation. Some very succulent plants, and others with fine but rigid leaves—the heath and pine tribe, for example—require to be plunged for an instant into boiling water ere they are pressed. In this case the super-abundant moisture must be absorbed by a cloth or by blotting-paper.

When sufficiently dry the specimens should be put into dry papers, one sheet or folio between each ; except they be unusually woody (which is the case with oaks and pines,) and then more paper must be employed, care being used to distribute the specimens pretty equally over the sheets, and thus a great many may be safely stowed in a small compass. A slip of paper should be placed with each specimen, stating its name, if known, and the date and place of collection. Specimens so arranged are now ready for transport, either packed in boxes or covered with oil-cloth.

Mosses and cryptogamous plants may be generally dried in the common way : those which grow in tufts should be separated by the hand to form neat specimens. Seaweeds require a slight washing in fresh water, and common blotting-paper is the best for removing the moisture from this tribe of plants.

It is almost needless to add that *all plants*, whether living or dried, ought to be transmitted to Europe with the least possible delay ; the latter, especially in hot or moist climates are often soon destroyed by the depredations of insects.

BOTANICAL AND PHARMACOLOGICAL INQUIRIES AND DESIDERATA.

AFRICA—WEST COAST, ALSO EAST COAST, INCLUDING THE RED SEA AND ARABIA.

Copal.—Information is much desired respecting the varieties of this substance which are found in commerce, and which are exported from the West Coast of Africa. Some copal is believed to be dug from the ground, but one variety at least is collected from the tree. This is the Sierra

Leone copal, and is produced by *Guibourtia copallifera*, Bennett, *Kobo* of the natives; specimens of this tree, including the ripe pods, are requested; it grows at Goderich and in other localities near Sierra Leone.

Grains of Paradise.—Although *Amomum Melegueta*, Roscoe, the plant which yields this drug, is now well known, there are some other interesting species nearly allied, with which botanists are very imperfectly acquainted. It is, therefore, desirable to procure specimens of such plants from various parts of the West Coast of Africa. These specimens should comprise the flowers and fruits, as well as the foliage. As the flowers are very delicate, it is necessary to preserve some specimens in spirit of wine or in dilute acetic acid. Some specimens of the fruits should also be preserved in the same manner. As the species often grow intermixed, and as flowers and fruits are produced at different seasons, special care is requisite to avoid confusion.

Korarima Cardamom is the name under which the late Dr. Pereira has described an Abyssinian cardamom, having the shape and size of a small fig, which is exported from Mussowah, a port at the southern end of the Red Sea. This drug, which has long been known in medicine, is perforated at the smaller end, and, when strung upon a cord, is commonly used by the Arabs and Abyssinians as beads for their *mesbehas* or rosaries. It is said to be brought to the market of Baso, in Southern Abyssinia, from Tumbé, a country situated in about 9° N. lat. and 35° E. long.

The plant for which the name *Amomum Korarima* has been proposed, is entirely unknown.

Olibanum.—The Olibanum found in European commerce is believed to be produced partly on the African coast, near Cape Gardafui, and partly on the southern coast of Arabia, whence it is shipped to Bombay.

Olibanum is also produced in India by certain species of *Boswellia*, called *Salai* or *Saleh*, one of which is *B. glabra*, Roxb., another *B. thurifera*, Colebr. It is extremely doubtful if the Olibanum, afforded in India by these trees, finds its way to Europe, but information on this point is desired.

African Olibanum is yielded by a tree called *Plösslea floribunda*, Endl. (*Boswellia*, Royle;) but as the drug varies considerably in appearance, it is highly probable that it is obtained from more than one species. The variety called *Lubân Mattee*, from its being shipped at Bunder Mattee, is, for instance, a very different drug from ordinary olibanum.

A resident at Aden may be able to gather some information upon this subject as well as upon the next.

Myrrh.—This celebrated drug is collected in great quantities by the Somali tribes on the African coast, near the southern extremity of the Red Sea, whence it is brought to Aden for shipment to Bombay.

A variety of myrrh, which is probably yielded by another species, is also produced (according to Vaughan) in a district lying forty miles to the east of Aden, to which place it is brought for sale.

A third variety, distinguished by the Arabs as *Bissa Bôl*, is also collected by the Somali tribes and sent by way of Aden to India.

It is a point of much interest to determine with accuracy the plants which afford these several sorts of myrrh, and for this end it is earnestly requested that those who have any opportunity for investigating the subject will not neglect to do so.

ASIA MINOR, PERSIA, CENTRAL ASIA.

Gum Tragacanth is produced in Asia Minor by several species of *Astragalus*, which it is desirable further to identify. Travellers and others who have the opportunity should preserve specimens of any species seen to yield the gum, as well as specimens of the gum itself; noting at the same time whether the latter was obtained from incision in the stem, or whether exuded spontaneously. Fine gum tragacanth is produced at Caissar (or Kaisarieh) and Yalavatz, in Asia Minor, at which places the practice of making longitudinal incisions in the stem of the shrub is adopted; the gum is also collected at Isbarta, Bourda, Angora, &c.

Gum tragacanth is frequently adulterated with another gum, which has been called *False Tragacanth*, *Hog Gum*, *Bassora Gum*, or *Gum Kutera*. At Smyrna it appears to be known as *Caraman Gum*. What is its origin? One of its properties is to swell up into an opaque mass, upon being placed in water, in which, however, it does not dissolve.

Storax.—None of the storax found in commerce in modern times is derived from *Styrax officinale*, L.; yet it is certain that this tree is capable, under favorable circumstances, of yielding a highly fragrant resin which was once much valued.

Authentic specimens of this resin, which is the original and legitimate *Storax*, are much desired. It was formerly produced in the south of Asia Minor, where the tree is still found in great abundance.

Salep.—Obtain specimens of the different plants which yield salep in Asia Minor, Persia and Cashmere, and especially of those that afford the best kinds.

What is the plant which affords the drug called *Badshah Saleb*, or Royal Salep? Where is it produced, and for what purpose is it valued? It has been exported to England from Bombay.

Sumbul Root.—Nothing definite is known respecting the botanical origin of this remarkable root, which is said to come into Europe by way of Russia. It is probably produced somewhere in Central Asia.

Assafœtida.—Although the ordinary assafœtida of commerce is doubtless the produce of *Narthex Assafœtida*, Falc., there are some varieties of the drug which, it is reasonable to conclude, are derived from other species. One of those sent from India to the Great Exhibition of 1851 was a brown pellucid gum-resin containing pieces of the stalk of the plant, and differing considerably from ordinary assafœtida.

Another variety, which has long been known, has been called *Stony*

Assafœtida, from its containing about 50 per cent. of gypsum, an addition which, in the case of so cheap a drug, it is difficult to understand.

Assafœtida is produced in Persia, and reaches Europe by way of Bombay.

Sagapenum, a gum resin resembling assafœtida, but not acquiring a pink color upon exposure to the air, and of not so strong an alliaceous odor. As it is occasionally shipped from Bombay, it is presumed that it is produced in Persia. Though it has been used in medicine for ages, its botanical origin is not ascertained; from analogy, however, we may infer that it is the produce of some large plant of the nat. order *Umbellifera*. Compared with assafœtida and galbanum, sagapenum is a rare and costly drug.

Galbanum.—The remarks we have made upon sagapenum apply to a great extent to the gum-resin known as *Galbanum*. Galbanum is, however, a far more abundant substance than sagapenum. It occurs in trade in two varieties, which are so distinct as to lead to the inference that they are yielded by distinct plants.

Galbanum is said to be imported into Russia in large quantities by way of Astrachan, but that which reaches England comes principally from Bombay.

Opopanax, another fetid gum-resin, the produce, according to most authorities, of *Opopanax Chironium*, Koch, a large umbelliferous plant, native of the south of Europe, and of Asia Minor. There is no modern account of the collection of this drug, nor is its place of production ascertained.

Rhubarb.—Determine the true source of the various sorts of medicinal rhubarb sold at Kiachta to the Russians, and of that exported from Canton. Strange to say, we are still in the dark respecting the origin of this most valuable drug! In this and all such cases the drug should be procured by one who is an eye-witness to it being gathered, and specimens of the foliage, flowers, and fruit, carefully dried for the herbarium on the spot, should accompany it.

INDIA, SIAM, INDIAN, ARCHIPELAGO, CHINA, ETC.

Catechu.—Observe the processes by which the various kinds of *Catechu Cutch*, *Terra Japonica*, and *Gambir* are obtained; and if from trees, whether from others besides *Acacia Catechu*, *Areca Catechu*, and *Uncaria Gambir*. We wish to identify the trees with the respective extracts.

Grass Oils.—The grasses used in India for affording the fragrant essential oils, known as *Lemon-grass Oil* or *Essence of Verbena*, *Ginger-grass Oil*, *Citronelle*, &c., require investigation. What, for instance, is the source of the essential oil imported from Ceylon as *Oil of Lemon-grass?* It is considered quite distinct from *Citronelle*, which is also a production of the island.

Benzoin or *Gum Benjamin*.—Obtain complete specimens of the tree which affords this drug in Siam.

Cardamoms.—The so-called *Wild* or *Bastard Cardamom* of Siam is produced by *Amomum zanthoides*, Wallich, a plant of which *complete* and *well-preserved* specimens are requested in order that it may be described and figured.

The seeds *per se* have been imported into England, while the empty capsules are found in the drug-shops of China. Are the latter exported from Siam to China?

What is the origin of the cardamom called by the Chinese *Yang-chun-sha*, the *Hairy China Cardamom* of pharmacologists? It is said to be produced in the province of Kwang-tung, and it may be a native of Cochin China.

Nothing is known of the origin of the scitamineous fruit to which the name *Large Round China Cardamom* has been given, and which is known to the Chinese as *Tsaou-kow*. The same remark applies to the *Bitter-seeded Cardamom*, *Yih-che-tsze*, and *Ovoid China Cardamom*, *Tsaou-kwo* or *Quâ-leu*; it is probable that all of them are productions of the south of China, or of Cochin China.

Cassia Bark.—Specimens are much desired of the tree which affords this bark in Java, on the Malabar coast, in the south of China, and in Cochin China. Botanical specimens should in all instances include good samples of the bark, young and old, obtained from the same tree.

Cassia Buds.—These are the immature fruits of a *Cinnamomum*, native of Cochin China, specimens of which are requested.

An inferior kind of Cassia Buds, known as *Lovengoopoo*, is found at Madras. What is the species that affords it?

Aromatic Barks of other *Laurineæ*, as *Culitlawang*, *Massoy*, *Sintoc*, are objects of commerce in the Indian Archipelago, and are but imperfectly known in Europe. The traveller should embrace the opportunity, when it occurs, of seeing the bark collected, and of obtaining authentic specimens of it, and of the tree yielding it.

Massoy Bark is produced on the west coast of New Guinea.

Galangal Root.—Endeavor to procure the plant affording this drug, which is imported from the south of China.

Elemi.—This resin is abundantly produced in the forests of the Philippines, where it often assists in giving a cheerful blaze to the fire of the traveller. It is also exported from Manilla as a drug. The tree that affords it is probably a *Canarium*, but it is desirable to have complete specimens in order to ascertain the species with exactness.

Elemi is also produced in Mexico, where it is known as *Copal*; it occurs in commerce in scraped pieces, which are semi-cylindrical, yellowish, semi-opaque, and having the usual strong and fragrant odor of Elemi. This drug is the produce of *Elaphrium elemiferum*, Royle, a tree occurring near

near Oaxaca, of which specimens are requested in order that it may be further examined and described.

There are other resins, of whose origin little is known, which have been imported from Mexico, Brazil, and other parts of tropical America as *Elemi*.

CENTRAL AND SOUTH AMERICA.

Sarsaparilla.—The species of *Smilax*, the roots of which constitute the various sorts of sarsaparilla found in commerce, are very imperfectly known. Good botanical specimens, comprising flowers, fruits, and leaves, and accompanied by the stem and roots, should be carefully preserved and transmitted to England for determination.

The so-called *Jamaica Sarsaparilla* grows near the Chiriqui Lagoon, in the state of Costa Rica, and a species very similar, if not identical with it, at Bajorque, on the Rio Magdalena, New Granada. Other sorts of sarsaparilla are produced in Mexico, Guatemala, Honduras, Brasil, &c. That of Guatemala grows in the department of Sacatepeques in that state.

Rhatany Root.—A variety of this drug has been exported of late years from Savanilla, in New Granada. Obtain specimens of the plant from which it is derived.

Malambo Bark, a highly aromatic bark, produced in New Granada. Of its origin nothing certain is known.

Balsam of Copaiwa is imported from several parts of Brazil : it varies somewhat in properties, and is the produce of several species of the genus *Copaiifera*. It is desirable to obtain the balsam of each species, with a specimen in flower and leaf, and, if possible, in fruit, of the tree affording it, and the name of the district where the tree grows, and its native appellation there.

Lignum nephriticum.—The name of a remarkably aromatic wood sent to the Paris Exhibition of 1855, from the department of Vera Cruz, in Mexico. By what tree is it afforded ?

Lignum nephriticum.—This rare wood was sent to the Paris Exhibition of 1855 from Mexico. To what tree is it to be referred ?

Cinchona Bark, or *Peruvian Bark*.—This valuable drug, the only source of quinine, is derived from various species of *Cinchona* growing along the whole chain of the Andes, from New Granada to Bolivia. Of these trees it may be said that good, pressed, botanical specimens of any species are interesting and desirable. Such specimens ought to include the flowers and fruits, and in every case to be accompanied by several pieces of the bark, young and old, stripped from the *very* tree from which the botanical specimens were gathered : all being most carefully and clearly labelled upon the spot with every particular worthy of note.

A point of considerable interest, still to be determined, is the proportion of alkaloids contained in the *young* and *old* bark. For this determination

two or three pounds of each sort of bark are requisite ; and for a perfectly fair experiment they ought to be collected from the same individual tree.

The attention of Englishmen residing in the countries indicated is especially requested to this by no means unimportant question.

Balsam of Peru.—The drug known under this designation is produced, not in Peru, but in Central America, in a district lying between Acajutla and Port Libertad, in the western part of the state of San Salvador, known as the *Balsam Coast*. The tree which affords it, may also be found at Ispanguasate (where it has been planted,) and near Chiquimulilla, and on the coast of Suchutepeques. Of this tree, which is the *Myrospermum Pereire* of Royle, good flowering specimens are much desired, as are also fresh seeds, in order that the plant may be raised in our hot-houses. The seeds should be transmitted by post, as their vitality is not long retained.

The balsam which is called *Balsamo negro*, is brought for sale to Sonsonate, previously to shipment at Acajutla.

Although the plant above mentioned is undoubtedly that which affords the balsam of Peru of commerce, yet there is reason to think that a balsam of similar character was formerly extracted from other species. Monardes (1565) states that balsam of Peru is *lighter* than water, but the balsam of modern times is *heavier*. Inquire into this. Is not balsam prepared at Chongon, near Guayaquil? Is any produced in Mexico? We have received the seeds of a *Myrospermum* from that country.

Balsam of Tolu.—*Myroxylon Toluifera*, H. B. K., the tree which affords this substance is very imperfectly known. It grows in New Granada, in the neighborhood of Turbaco, and especially in the high savannas near Tolu, Corozol, and the town of Tacasuan. It is also found at the mouth of the river Sinu, near El Zapote, and here and there on the banks of the Rio Magdalena, in the environs of Garapatas and Mompox.

Is it not possible to obtain at least the seeds, not to mention a supply of good botanical specimens, of this famous tree, and some account of the extraction of and trade in the balsam it affords?

ON AFRICAN TURMERIC.

BY WILLIAM F. DANIELL, M. D., F. L. S.,

Hon. Member of the Pharmaceutical Society of Great Britain.

Among other vegetable products resorted to by the native Africans for the purposes of dyeing, are certain tubers procured from a plant apparently indigenous to West Africa. Being frequently offered for sale in the markets of Sierra Leone, my attention was engaged in 1856 to discover their source and appliances. These rhizomes, in their fresh state, were of a greyish

or pale orange color externally, smooth, somewhat plump and fleshy, variable in size, and marked by a series of transverse rings; one extremity being partly round or blunt, the other flat, having a central eschar or notch, indicating its detachment from another of maturer growth. They were usually met with under the form of slightly-curved, more or less cylindrical masses, from one to five inches in length, and about half to one and a half inches in diameter. A number of minor lateral offshoots or tubercles proceeded from most of the larger varieties, which thus often assumed a palmate conformation. Occasionally intermixed were large round tuberous roots, distinguished by similar annular wrinkles, and evidently constituting the parent stock from which the preceding ramifications had sprung. When broken, the internal surface presented a deep golden or orange tint, with a smooth, wax-like fracture. With the exception of a brighter hue, their physical characters so closely resembled those of the East Indian Turmeric, that it would be difficult to define their distinction in the absence of other specific differences, since the African drug is equally endowed with the peculiar odor and taste of the former, tinges the saliva yellow, and freely imparts its coloring principles to both spirit and water.

Laboring under the impression that these rhizomes could only have been furnished by some species of *Curcuma*, I was induced to place several in my garden, with the view of ascertaining to what particular variety they pertained. In the course of a few months the young shoots appeared, flowered, and much to my surprise, proved to belong to a beautiful *Canna*, commonly designated in colonial parlance by the name of *Indian shot*. Observing that similar plants were cultivated in the adjacent negro enclosures, I had a quantity of their roots dug up, which were found to correspond in every respect with those I planted. Specimens in leaf, flower, and fruit, were carefully preserved and transmitted to my friend Mr. Bennett of the British Museum, and by him determined to be identical with the *Canna speciosa* of Roscoe. This species does not appear to have been mentioned by botanical writers as indigenous to Western Africa, and has probably been confounded with the *Canna Orientalis*, or *Indica*, which was stated to be more or less common in Sierra Leone and other regions of the coast to the southward. Roscoe,

in his work on Monandrian plants, has given a good figure and description of this production reared in the Botanic Gardens of Liverpool, from seeds brought from Africa in 1819.* Roots were subsequently received from Dr. Wallich, at Calcutta, who had discovered the same species growing in Nepaul.

During the early settlement of Sierra Leone, a great variety of useful seeds and roots were forwarded by Dr. Roxburgh from the East Indies, with the object of increasing the commercial resources of the infant colony. Suspecting this plant might thus have been introduced and subsequently naturalized by culture I instituted a series of inquiries among the old African settlers, in the hope of obtaining some satisfactory information relative to its origin. Sufficient data, however, did not exist to determine this point. Several of the negro inhabitants nevertheless asserted that it had been imported from the Slave coast, where the roots were extensively employed by the Foys and Mahes to dye grass and cotton fabrics a yellow hue. It is therefore no doubt the product to which Robertson alludes, when he observes that in Dahomey "these yellows are dyed with a root, which has the appearance of ginger. The color appears to resist acids better than some of those used in Britain."

Thonning, in his *Beskrivelse af Guineske Planter*, briefly describes a *Cannarubra* flourishing in Acquapim, and the *Curcuma longa* as cultivated by the natives in that portion of the Gold coast, but does not specify any distinct locality where the latter may be procured. Hitherto, no species of *Curcuma* has been described as indigenous to intertropical West Africa, and it seems doubtful whether it has even been introduced by European colonists; if so, the cultivated plant has since disappeared. Thonning, doubtless from a casual inspection of these tubers, may have been led to the erroneous conclusion that they pertained

* His descriptive outline is as follows:—

Gen. Char. Anther single, attached to the margin of the petal-like filament; style erect, club shaped; stigma an obtuse scale; capsule 3-celled; seeds numerous, globose.

Spec. Char. Spike erect; upper lips of corolla in two sections, ovate, deeply bifid, claws long, narrow, lower lips narrow, linear, notched at the apex, declined towards the right; leaves broad lanceolate, strongly nerved.

to the above *Curcuma*, which on inquiry would be apparently confirmed by their aboriginal appliances and other peculiarities indicating a remarkable affinity to turmeric.

Similar kind of rhizomes are produced, probably from this *Canna*, to a limited extent in the Portugese Island of St. Thomas, a small sample of which I purchased in 1850, at St. Anna de Chaves, and deposited as specimens in some of the economic museums in this country.

African turmeric is cultivated by the inhabitants of Sierra Leone, chiefly for the rich yellow dye it yields. Grass cloths, mats, baskets, and other aboriginal manufactures are colored from a peculiar preparation of the roots, which, retaining their permanency of hue, become highly esteemed as articles of traffic. The brilliant flowering spike, large bright green leaves, and luxuriant development, render the plant one of the most conspicuous ornaments of the colonial gardens. Its inflorescence occurs in April, and, in fact, throughout the rainy months, the tubers attaining their maturity about December or January; they are then dug up and exposed to the sun, previous to their collection for the markets. The price hitherto has been merely nominal, being solely dependent on the demand. In some parts of India, this, and other species of *Cannæ*, have been considered sacred to Buddha, owing to an ancient tradition which ascribes their source to the sprinkling on the earth of a few drops of blood, from an accidental wound of his foot against a stone. Hence the seeds are occasionally used in the formation of rosaries, which constitute important adjuncts in certain religious rites and ceremonies.

The long palmate tubers become much shrivelled up by age, are marked with longitudinal wrinkles, and undergo such external alterations as lead to a considerable modification of form. Paper tinged with a decoction of the bruised root furnishes characteristic changes, precisely in accordance with those obtained from turmeric, and, in a series of brief experiments made by my friend Dr. G. O. Rees and myself, they appeared to correspond in several respects with those stated by pharmaceutical authorities. The color, however, produced from alkalies is of a deeper tint, and as a test indicates a superior sensitive action to their influences. The yellow coloring matter (*Curcumin?*), on which

the dyeing properties depend, may probably be procured by a similar process by which it is extracted from the different *Curcumas*. A consideration of the preceding details would lead to the supposition that this product may comprehend one, among other varieties of turmeric imported into England from the East Indies, and the subject is therefore worthy of careful investigation.—*London Pharm. Jour.* Nov. 1859.

ON ALCOHOLIC FERMENTATION.

By L. PASTEUR.

When the accurate analyses of Gay-Lussac and Thenard and those of De Saussure had definitely established the composition of sugar and alcohol, it became easy to show theoretically that by mixing alcohol and carbonic acid, the composition of sugar might be reproduced. This was indicated by Gay-Lussac in a letter addressed by him to M. Clement in 1818, which concludes thus:—"If we suppose now that the products furnished by the ferment may be disregarded in relation to the alcohol and carbonic acid which are the only sensible results of fermentation, we shall find that 100 parts of sugar, 51.34 are converted into alcohol, and 48.66 into carbonic acid during fermentation." This deduction of Gay-Lussac coincided with the views promulgated twenty-five years before by Lavoisier upon alcoholic fermentation, and it removed all the doubts which sooner or later must have been raised by the inaccurate experiments of that illustrious chemist.

It was admitted, however, that experiment could not in all points confirm Gay-Lussac's theories, for Lavoisier had rightly indicated that a small portion of sugar was transformed into an organic acid, which he supposed to be acetic acid, but which has long since been identified with lactic acid.

The results of the author's experiments are at variance with the general opinions upon the products of fermentation:—

1. The acid of alcoholic fermentation is never either acetic or lactic acid.

2. Alcoholic and carbonic acid are not the only products of the splitting-up of sugar. They are always accompanied by succinic acid and glycerine. The proportion of succinic acid

varies between 5 and 7 thousandths, and that of glycerine between 25 and 36 thousandths of the weight of sugar set in fermentation.

3. The alcohol and carbonic acid do not equate with a definite weight of sugar ; that is to say, the alcohol and carbonic acid are not in the proportions indicated by the theoretical equation ; more carbonic acid is evolved than is required by the weight of alcohol produced.

4. More than 1 per cent. (1.2 to 1.5) of the weight of sugar is fixed upon the yeast in the form of various matters, amongst which are cellulose and fatty substances.

Thus of 100 grms. of sugar which are fermented, 5 to 6 grms. do not follow the equation of Lavoisier and Gay-Lussac ; and this portion of sugar is transformed by assimilating water in such a way as to furnish in ordinary cases—

	grm.	grm.
Succinic acid,	0.6	to 0.7
Glycerin,	3.2	" 3.6
Carbonic acid,	0.6	" 0.7
Cellulose, fatty matters, and other products still undetermined,	1.2	" 1.5
 Total.	 5.6	 to 6.5

The remainder of the sugar appears to correspond with the whole of the alcohol and the rest of the carbonic acid, in accordance with the equations of Lavoisier and Gay-Lussac.

The question here arises whether the succinic acid and glycerin with the carbonic acid which accompanies them, may not be the results of a secondary and accidental action. This the author cannot admit, as in more than a hundred analyses of fermentations effected under the most different conditions, these products were always obtained.

In wine also he found that succinic acid and glycerine are present in considerable quantity ; 1 litre of wine contains 6 to 8 grms. of glycerine, and 1 to 1.5 grm. of succinic acid. The solid residue of the evaporation of a litre of wine being from 15 to 25 grms., it will be seen that more than a third, and often more than half of the solid materials of wine have been unknown to the present day.—*Lon. Chem. Gaz.* Oct. 15, 1859, from *Comptes Rendus*, June 27, 1859.

ON THE PREPARATION OF CARYOPHYLLINE.

BY DR. THEODORE W. C. MARTIUS.

Professor of Pharmacy and Pharmacognosy in the University of Erlangen, Hon. Mem. of the
Pharmaceutical Society of Great Britain, &c.

After that Baget and Lodibert had made the discovery of caryophylline in cloves, in the year 1825, it was remarkable that Bonastre should find none of this constituent in the cloves of Cayenne. As I have, upon two occasions, successfully employed this particular kind of cloves for the preparation of caryophylline, there appears ground for concluding either that I operated upon a greater quantity of material than did Bonastre, or that I adopted an entirely different process in order to obtain this hitherto rare substance.

In the preparation of oil of cloves, it is necessary, in order to obtain the largest produce, to subject the cloves to repeated distillation. In this process, however, one cannot avoid that through a too strong fire some of the contents of the still should splash over [*des Blaseninhalt überschiesst*], especially during the last distillation, when a comparatively small quantity of oil comes over. In such case, the oil is mixed to a greater or less extent with dusky, white, or brown flocks, which subside to the bottom of the vessel. If the distilled product be now placed on a filter, the watery part speedily passes through, but the oil, with its flocculent admixture, filters with extreme slowness. After several days the oil will have run through, leaving, however, both the flocculent residue and the filter strongly impregnated with it. Let the filter and its contents be now washed with cold alcohol of 33° Beck [= sp. gr. 0.839] until the latter runs off tasteless—for which Process a comparatively large quantity of alcohol is requisite. The filter should now be dried; its contents should be collected, mixed with much animal charcoal, treated with boiling alcohol (.839), and filtered hot. The clear solution upon cooling sets into a uniform white magma. This, which is caryophylline in an amorphous form, is to be transferred to a filter, allowed to drain, and then dried in the air. I have never, by this process, obtained caryophylline in the form of crystals, probably from my solutions being too much concentrated. The process is, upon the whole, simple, though costly as regards alcohol; I have applied it in the case of Bourbon and Amboyna cloves, as well as in operating upon Cayenne cloves.

The following process, however, is simpler and less expensive. It was put in practice upon some Cayenne cloves, and in fact upon a sample, 10 lbs. of which, after a fourteenth distillation, yielded only $25\frac{1}{2}$ ounces of oil, while in general, from a like weight, one ought to obtain $33\frac{1}{2}$ ounces.

If there be taken cloves (of any kind) which by repeated distillations with water have been as much as possible deprived of essential oil, and they be introduced with water into an alembic charged up to the neck, and a quick heat be then applied, there suddenly passes over a brown, flocculent, turbid liquid. To refer to an actual experiment; after Cayenne cloves had been distilled for the thirteenth time, and the quantity of oil obtained in the last distillation was so inconsiderable that further treatment was thought unnecessary, I rapidly subjected them four times over to the process described, thus obtaining from 38 to 40 litres of a brown distillate. The alembic was now emptied and cleansed from the exhausted materials, the brown distillate was introduced and distilled. From the first 7 litres of milky distillate that passed over, there separated 5 drachms of oil, which, however, was of weak taste, and perhaps consisted chiefly of caryophyllic acid. The distillation was continued until the solution that passed over scarcely possessed the smell or taste of cloves, and was as clear as water. On the next day, the residue remaining in the alembic having become cold, was transferred to a filter and washed with cold water until it ceased to yield any color. When dried, this mass constituted crude caryophylline-free, however, from all trace of oil of cloves. It was now transferred, with the addition of some animal charcoal, to a proper (and for such extractions peculiarly adapted) tin vessel, treated in a water-bath with boiling alcohol (.839), and the solution filtered hot. The crude caryophylline, which had separated upon cooling, and which formed with the alcohol a sort of magma, was now transferred to a filter; the spirit running from it of a yellowish brown. The filtered liquor was again thrown upon the charcoal, raised to the boiling temperature and filtered, by which, however, but little caryophylline was separated. This, however, was placed upon a filter; the alcohol that drained from it was distilled off to a few ounces, and the residue mixed with some animal charcoal and evaporated—and then treated

with fresh boiling alcohol. The caryophylline thus purified, and perfectly white, weighed, when added to that previously obtained, 1 ounce and 5 drachms.

A portion of the cloves which had been submitted for the fourteenth time to the process of distillation, and had then been dried in the air, were treated in the tin vessel with boiling alcohol, and rapidly placed on a filter. The brown solution, upon cooling, deposited some caryophylline in cloudy flocks, but its quantity was inconsiderable; and when it is requisite to prepare the substance in larger quantity, the process, just described, of driving it over with water is certainly the most to be recommended, and the cheapest.

If one had to operate upon a considerable quantity of cloves, as 50 pounds or more, it would probably be the simplest way of all, after obtaining the oil, to transfer the contents of the still while yet hot to a coarse strainer, and when drained again, to boil them. The mixed decoctions might be allowed to subside for some days in large glass bottles, the clear supernatant liquor poured off from the sediment, and this latter then washed with cold water several times. Having been thrown upon a filter and dried, it might then be treated with alcohol and animal charcoal as already described.—*Lon. Pharm. Journ. Sep. 1859,* from *Wissenschaftliche Mittheilungen der physicalesche-medicinischen Societät zu Erlangen*, 1859.

MANUFACTURE OF OTTO OF ROSES.

At a meeting of the London Pharmaceutical Society, Oct. 5, 1859, the Chairman read the following extracts from a paper he had received, originating from a respectable mercantile house at Constantinople, and relating to the manufacture of otto of roses:

The distilling of otto of roses being completed, including those places lying in the centre of the Balkan mountains, we beg to submit the result in the following report:—

In order the better to arrive at the quantity of otto produced, we herewith give a list of all the places from which it is procured; the number of stills noted below we have with much trouble ascertained personally, and we can say with certainty that on the whole not more than 2 per cent. of the manufacturers have been left out.

DISTRICT OF KEZANLYK.

	Stills.
† Kezanlyk	62
† Haemithli.....	54
† Baschirli.....	21
† Ascharrasaranalı	1
† Jokarrisaranalı	7
* Sofiar Jokarkı.....	32
† Juranli.....	8
† Akhbasch.....	22
† Keterrilass.....	4
* Bojüll Oba.....	82
† Kutschük Oba.....	42
† Doimüchlär.....	50
† Oktschülär.....	107
* Melemess.....	90
† Ilitschali.....	23
† Kara Jeikli.....	15
* Meschid Sünedlér.....	12
* Tschami Sünedlér.....	29
* Kössöl-atsch.....	24
† Müghlüss.....	30
† Landra-köi.....	8
† Aschaki Sofér.....	4
† Jeikanli.....	27
† Kischlar.....	12
† Oklanli.....	31
Jeni Mahaiö.....	2
Jassö Wirason.....	42
Kassludcha.....	40
Tschannakschi.....	9
Hamurusus.....	19
Aeschüklar.....	22
Oruslér.....	12
* Armachan-koi.....	28
† Karchanli	10
† Emischlér.....	14
Hirsova.....	92
* Kowanlik	26
† Ketschi-törrö	31
Hass-köi.....	5
† Jumurtschuli.....	19
* Schibbkarr.....	103

41 villages with 1271 stills

DISTRICT OF JENI SAGRA.

Aeschikdschö.....	6
Hain-köi.....	14
Jun-köi.....	21
Kierdidsch.....	2
Ferdidsch.....	11
† Tersi Oba.....	3
Tschumahali.....	1
Ekiestsche.....	1
Azatli.....	3
† Adler.....	1
Tschasnadscha.....	14

11 villages with 77 stills

* Signifies first quality. † Signifies second quality.

DISTRICT OF PHILOPPOEL.

	Stills.
* Carlova.....	12
* Karatscha-at.....	13
† Isak Faki.....	1
† Müslitchali.....	5
† Sötschik.....	9
Sarö Tesmitschilé.....	4
† Kotschi Oglulér.....	2
† Aschagki Baltschilér....	3
Muslin Baltschilér.....	8
† Maghmuilar.....	10
† Tschaylér.....	21
† Kuri Aghadschilér.....	5
† Kalaidschilér.....	3
† Ellilér.....	1
* Rachmanlö.....	39
* Hadschar.....	66
† Berrada-köi.....	19
* Tokannadscha.....	2
† Kurfanli.....	2
† Tschatalt-töpö.....	12
† Iidscha.....	4
† Mukerli.....	10
† Tschakurli.....	20
† Haemithli Käpir.....	7
† Deirmen Maghalëssi....	2
† Takudscha Fabrikan....	5
* Sentschirli.....	13
† Airanli.....	5
† Jeni-köi	7
† Tschananakschilér.....	2
† Kuri Haemithli.....	1
† Kutschimarlar.....	18
Dari Obassi.....	4
Bokas-köi.....	9
* Aschagki Omar Obassi..	33
Kobir Omar Obassi.....	18
Kawassdschik.....	14
Perasik.....	24
Odu-köi.....	1
Peruschtihsa.....	1
* Kalesér.....	27
Kurd Bey-köi.....	5
Müderis..	43
* Arablö.....	8
* Adschä Kilissae.....	2
* Aburlar.....	2
Ewdachilér.....	1
† Tartarli.....	3
† Jan Obassi.....	8
† Aeschiklér.....	3
† Kerranlér.....	8
* Tökö	17
* Abdul Rachmanly....	41
Perassaden Derwendi...	30
* Jan Béyliki.....	25
* Kara Sarli.....	14

Carried over 671 stills

† Signifies second quality. ; Signifies weakest quality.

	Stills.		Stills.
Brought forward	671		Brought up 134
*† Teröli.....	41	† Tökö.....	3
*† Kösserlér.....	46	† Kara Werlér.....	5
*† Köllerlér.....	18		
*† Okdschilér.....	10		
†‡ Salih-köli.....	18		
	<hr/>		20 villages with 142 stills
	61 villages with 804 stills		
DISTRICT OF ESKI SAGRA.			
†‡ Eski Sagra.....	9	†‡ Tschatall-tepe.....	8
†‡ Kerista.....	6	† Kornaukschi.....	19
†‡ Kolla.....	4	† Ewitschilér.....	10
†‡ Azérli.....	4	† Kalfa.....	2
†‡ Buklumik.....	2	† Jeni Mahlö.....	5
†‡ Idir Bey.....	7	*†‡ Jeni Schar Jokarki Mahlö.....	91
†‡ Kirk Owa.....	9	† Jeni Schar Aschachki Mahlö.....	13
†‡ Ismawli.....	2	† Karatschi Wiran.....	10
†‡ Jeni Mahalö.....	9	† Aschiolér.....	15
†‡ Derbend.....	9	† Ala Kün.....	31
†‡ Anserlér.....	9	† Schäkerr Buna.....	3
†‡ Baraklér.....	1		
†‡ Ada-tépē.....	15		
†‡ Kassanka.....	31		
†‡ Sonkurlér.....	1		
†‡ Palikli.....	10		
†‡ Pantikli.....	2		
†‡ Aeschek Sinekli.....	4		
	<hr/>		11 villages with 207 stills
	Carry up 134 stills		Total : Kezanlyk....41 villages with 1271 stills
		Philopoppel.61	" " 804 "
		Tschirpan.11	" " 207 "
		Eski Sagra.20	" " 142 "
		Jeni Sagra.11	" " 77 "
	<hr/>		144 villages with 2501 stills

In the past year there were about 3000 stills at work in the places named. The considerable decrease in this year applies only to the districts of Philoppoppel and Kezanlyk ; those places, in the former district especially, lying adjacent to and in the mountains, have had hard frosts, which in some villages destroyed the whole of the crops, and in the others reduced the yield compared to that of the previous year by one-fourth to one-third ; during last spring there were a great many floods in those places belonging to the district of Kezanlyk, those villages lying near the mountains suffering the most. For instance—

Kowanlyk, worked last year with 95 stills, and now with only 26
 Carlova, " " 25 " " " 12
 Iladscha, " " 30 " " " 4
 Jan Obassi, " " 25 " " " 8
 Tartarli, " " 8 " " " 3

and many other places in like manner ; in the district of Kezanlyk there are four villages which this year have not made a

single metical, whilst in the previous one they delivered a pretty considerable quantity.

In the district of Jeni Sagra the rose plant has been subject to a blight, similar to that of the vine so often mentioned of late years; the same, however, has for the present only shown itself to any extent in the village of Ekistsche, where it has destroyed seven-eighths of the crop, but it is feared that it will spread in the ensuing years.

But, nevertheless, that which has been spoilt by the unfavorable circumstances above named, has been amply made up by the cold and wet weather during the distilling period; only in the last fourteen days have we had great heat with little rain.

It is calculated that on the average twelve occas of leaves yield one metical; some days in the previous year seventeen occas would only furnish one metical, but this year the average can be taken at ten to eleven occas, and cases are known to us where, on a very cold day, eight to nine occas, and even seven occas of leaves, yielded one metical.

The period for distilling lasts in each place usually 14 days, and it is reckoned that in this time one still produces about 120 meticals, but we know that in this year in many villages it may be computed at least 170 meticals; it is true that this is only the case in the villages lying in the lowlands, whilst in the mountains the result is beyond all expectation bad; the night-frosts and floods have destroyed more than the half of the rose plants, and during the distillation the want of leaves was much felt, so that, for instance at Hadschar, only about 6000 meticals were procured from 66 stills, and the like was the case in the other villages similarly situated. These places were also unfortunate in the weather during the time of distilling; the harvest is always four to six weeks later in the mountains than the lowlands, and Hadschar and Rachmanlo, for instance, have only completed their distillation two days ago. The weather was, however, the last fortnight fine and dry.

If we take all the places together, we think we are right in computing the average of this year's yield at 185 meticals of oil to every still; the total amount therefore of otto of roses produced this year would be about 338,000 meticals, whereas in the

previous year it was only about 300,000 meticals. If we however, compare this with the last year as regards the qualities, a quite different result will be manifest. It is no doubt known that the mountainous districts yield a very strong and quickly congealing oil, whilst the villages, the lower they are situate, produce an oil so much the weaker, and only with very cold water either to be slowly congealed, or not at all. Last year those places situated in the mountains delivered about 70,000 meticals 1st strong otto of roses, and about 50,000 meticals of 2d quality; the lowlands gave about 60,000 meticals 2d, and about 120,000 meticals 3d quality; this year, on the contrary, one can only reckon to receive from the mountainous districts about 30,000 meticals 1st, and 40,000 2d; and from the lowlands, on the other hand, about 105,000 meticals 2d, and about 163,000 meticals 3d quality.

The decrease this year in 1st strong quality will hardly be noticed in Europe, as this description, with few exceptions, is not yet known there; the dealers here prefer buying the strongest quality, as it can bear a strong mixture of 3d quality, and even of geranium oil, and yet congeal pretty well. That which is known in Europe as 1st quality passes here for 2d.

They mostly sprinkle the leaves before distilling with geranium oil; these sorts of spurious oils we found at Kezanlyk, Kössöl-atsch, Müghlüss, Akhbasch, Schibbkarr, &c.; at Carlova, Rachmanlö, Böyük Oba, the manufacturers offered us oils, which, on examination, we found to contain not only geranium oil, but also cetaceum.—*London Pharm. Journ.*, Nov., 1859.

ON CELLULOSE AND THE COMPOSITION OF WOOD.

A highly important discussion has been recently carried on in the French Academy, involving some valuable investigations into the chemical nature and composition of the proximate principles of vegetable tissues. The discovery by M. Schweitzer of the solubility of cellulose in cuprate of ammonia, first suggested the means of further inquiry into the nature of the material of which the vegetable cells are constructed. It was early ascertained by M. Cramer, M. Payen, and others, that, while this cupric solution immediately dissolved the cellular tissue of cotton and

many other substances, it exerted no action upon the cellular membranes of several algae, champignons, the pith of trees, cork, &c.

M. Payen, in a paper on the analogies and points of distinction between cellulose and starch, accounted for this difference by attributing it to the protecting action of the intercellular matter, the incrustations of mineral, fatty, and nitrogenous substances, and the presence of the epidermis. He found, if all these foreign substances were removed, and the cellulose left in a state of purity, it was immediately dissolved ; and that when again precipitated by acids, it had all the properties and the composition of ordinary cellulose.

M. Fremy, in a paper on the composition of vegetable cells, showed, by means of the new reagent, that the inner walls of the cells of fruits, &c., consist, not of cellulose, but of a substance which he named *Pectose*, and which, under comparatively slight influences, and during the ripening of the fruit, is rendered soluble and converted into *Pectine*. In the course of this paper M. Fremy expressed an opinion that cellulose exists in several isomeric conditions, in one of which it is soluble in cuprate of ammonia, while in the other it is insoluble. This view, opposed to M. Payen's, was more fully developed in a subsequent communication, entitled "Distinctive Characters of Ligneous Fibres, Cortical Fibres, and the Cellular Tissue which constitutes the Pith of Trees." Up to that time the utricular tissues and vegetable fibres were considered to be formed essentially of the same substance, cellulose. M. Fremy argued, while the cupro-ammoniacal reagent immediately dissolves the cortical fibres of all plants and the utricular tissues of fruits, but exerts no action upon the pith of trees, it is difficult to consider these tissues as being formed of the same substance—the difference cannot be attributed to unequal penetration by the reagent, because the pith is much more porous than the mass of cortical fibres ; the impurity of the insoluble body cannot explain the difference in action either, because the pith, properly selected, presents all the characters of a pure immediate principle, containing but inappreciable quantities of mineral substances. These chemical characters, therefore, establish a striking difference between the cellular tissue of pith and cortical fibres. The wood or fibrous tissues is

also insoluble, when purified as far as possible from incrusting substances, and also even when examined in the young condition. It therefore appears that the ligneous fibres are quite distinct from the cortical fibres, the latter being soluble in cuprate of ammonia, while the former are insoluble. That this distinction cannot be accounted for by the greater hardness of the woody tissue may be inferred from the fact, that the cupro-ammoniacal liquor is capable of readily dissolving the albumen of the *Phytelephas*, or vegetable ivory, which presents much greater hardness and less porosity than the ligneous fibres. M. Fremy sought to ascertain what the conditions are by which the insoluble tissues may be rendered soluble. He found that rice paper, which is insoluble in the reagent, when submitted to the action of diluted mineral acids, is converted into a membrane which is soluble; alkalies also effect the same result, but more slowly. Acetic acid, even boiling, is incapable of producing any change. The ligneous fibres and pith are thus modified and converted into the soluble condition; the tissue of champignons, however, withstand the action of acids, and remain insoluble. From these facts M. Fremy concluded that M. Payen, in his endeavor to perfectly purify the tissues, employed agents which were capable of modifying the principle itself.

M. Payen has also brought forward several experiments tending to support his own view, and contends that there are not sufficient grounds for considering that the insolubility of certain membranes in the cupric reagent is due to the existence of several isomeric conditions of cellulose. He states that in all cases the cellulose, when freed perfectly from foreign matters, is soluble in the reagent, and that the means employed in the purification are not sufficient to effect any isomeric modification. The cellular tissue of pith, he states, although containing no incrusting substance, is nevertheless impregnated with certain bases, principally lime, which exist partly in combination with silica and partly with the organic matter. These are so uniformly distributed, that after the complete incineration of the organic matter a white skeleton remains, consisting principally of carbonate of lime, of which the weight amounts to 6-100ths of the dried pith, and which, examined under the microscope, still retain the form of the tissue. The cells of the pith are, in fact,

formed of cellulose, freed from organic incrustations, but their interior walls are coated with a thin layer of nitrogenous matter containing traces of fat and foreign bodies, which oppose the penetration and solvent action of the cupric reagent. To remove these impurities, the pith was cut into slices and immersed in the copper solution, by which the cells were colored and swollen, but not dissolved. The slices were then removed, and immersed in cold water, acidulated with hydrochloric acid, which slowly dissolved the lime, &c.; they were then washed with pure water, and upon again treating with the cuprate of ammonia they readily dissolved.

M. Fremy considers that in these experiments of M. Payen, the action of the hydrochloric acid and the means employed to remove the impurities are sufficient to effect a modification of the insoluble cellulose. He points out, that tissue as dense as vegetable ivory, or impure as the ordinary cortical fibres, is readily attacked by the cupric solution. He has also shown that the tissue of pith may be rendered soluble by simply exposing it to a temperature of 150° cent., or by boiling it in water for twenty-four hours, in both of which cases the mineral matter remains unaffected, the organic substance alone undergoing alteration. The tissue, thus modified and rendered soluble, furnishes upon calcination the same amount of inorganic matter, which retains the original form of the tissue, as the original and insoluble pith.

M. Payen again brings forward the following experiments:—In order to destroy the obstacles to solution which might result from the want of contact and wetting, owing to the interposition of air, the pith was submitted to a simple grinding in cold water, by which means 45-100ths of the total weight was rendered soluble; this proportion was further increased to 75-100ths by previously drying the tissue at 110° cent. in a vacuum. In another case, the pith was immersed in water, and maintained in a vacuum for some time; the tissue, thus gorged with liquid, was then frozen: when afterwards thawed, and agitated with the reagent, it immediately commenced to dissolve.

In this way 56 per cent. of the tissue was brought into solution: the insoluble portion contained 15.5 per cent. of inorganic matter. The insoluble part in this experiment, and in the pre-

ceding, was washed with ammoniacal water, to remove as far as possible the oxide of copper. In a third experiment, the pith was simply cut into extremely thin laminae, not exceeding from one to three millimetres in thickness, and agitated in the copper solution. In the course of an hour it commenced to dissolve, and 51 per cent. of the tissue was obtained in solution. M. Payen is prepared to admit that very great differences exist between different kinds of cellular tissue, and that the properties of the cellulose will constantly vary with the age, the thickness of the cell walls, the amount and the kind of incrusting matter, and the associated inorganic constituents; but that difference in the action of a single solvent, such as cuprate of ammonia, is totally insufficient to establish the existence of a distinct, although isomeric, species of cellulose.

M. Fremy, in his memoir on the composition of wood, instead of assuming, as physiologists have hitherto done, that the various tissues of the plant are on a basis of cellulose, which is variously associated and impregnated with foreign substances, considers that each tissue presents a particular chemical composition, and special properties depending in some manner on the peculiar physiological part which it supports in vegetation. He has already shown that the vegetable tissues contain a principle, *Pectose* (which has not been disputed), and which has been confounded with cellulose in microscopic observations. His analyses and examination of the *cuticle* also indicate that it possesses a distinct and peculiar composition. In this paper M. Fremy only recognizes under the name of *cellulose* that substance which is immediately dissolved by cuprate of ammonia, and which constitutes cotton, cortical fibres, or the perisperm of the *Phytelphas*. The substance which constitutes the pith of trees, and which is insoluble in the copper solution, he names *Para-cellulose*. Knowing that experiments made upon a mixture of different organic tissues might lead to grave errors, M. Fremy sought to isolate the different organs of which wood is constituted, and submit them to separate examination. Botanists consider wood as formed of fibro-vascular bundles, separated one from the other with cellular tissue, divided by rays running from the pith to the centre. In certain parts of this ligneous mass are found masses of fibre unrolled and annular or punctated vessels.

To obtain the ligneous vessels in a state of purity, entirely free from fibrous or utricular substance, the wood was treated first with dilute potash, which removed the tannin, albuminous and pectic matters. It was then submitted to the action of hydrochloric acid, commencing with dilute, and gradually changing it for stronger, until the fuming acid was employed. By this means the utricular tissue was partly dissolved, and the ligneous fibres rendered soluble in the cupric reagent. In the last place, this tissue is treated with cold concentrated sulphuric acid, then washed with water, alcohol, and ether. In this way the ligneous vessels are obtained perfectly pure. The substance of which these vessels are formed M. Fremy distinguishes by the name of *vasculose*. It is characterized by its insolubility in hydrochloric acid, concentrated of sulphuric acid, and cuprate of ammonia. It is dissolved, on the contrary, by potash, concentrated and boiling.

The utricular substance, which forms the medullary rays, is identical with the pith. It is, like it, insoluble in the cupric reagent, but rendered soluble by the action of acids, of alkalies, or of heat. It consists of *Para-cellulose*. The concentrated and boiling potash, which dissolves the ligneous vessels, can also dissolve the medullary rays; this solubility affords the means of isolating the third organ of the woody tissue: the ligneous fibres. Chippings of wood are treated in a glass flask with potash sufficiently strong and hot to effect the disorganisation of the wood. It is important not to go beyond that point, as the ligneous fibres themselves may be altered. The insoluble portion is afterwards removed, and washed with water, alcohol and ether. It consists of ligneous fibres, perfectly white and in a state of purity. Oak and deal were the woods employed by M. Fremy. The substance forming these ligneous fibres is named *Fibrose*; it is characterized by its insolubility in the alkaline solution, which dissolves the vessels and the medullary rays; by its solubility in sulphuric acid, which does not dissolve the ligneous vessels; by its insolubility in the cupric reagent, which immediately dissolves the cellulose, but does not attack the ligneous fibres until they are modified by chemical agents. Fibrose and cellulose may be also distinguished by the action of sulphuric acid, which immediately dissolves cellulose, converting it into

dextrine, which is not reprecipitated by water. Fibrose submitted to the action of strong sulphuric acid, dissolves like cellulose, but, on immediately adding water to the acid solution, it is reprecipitated in the form of a thick transparent jelly.—*Lon. Pharm. Jour. Oct. 1859.*

ON THE ODORS OF PERFUMES.

On occasion of the discussion which we have just recorded, M. Chevreul offered his ideas upon the mode of action of odoriferous substances. This discussion was intended to recall the publications which this distinguished chemist has made during the past thirty years—researches made specially to trace odors to their material causes. He reviews in the following manner the action by which bodies exert their odors when properly mixed with other odoriferous materials. 1st. Bodies themselves odorant disguise the odors of other substances, as a strong light overpowers a feeble one. 2d. Bodies being themselves odoriferous act in the manner of an acid in neutralizing a base. 3d. Solid bodies may act by capillary affinity to absorb odors, as is the case for example with charcoal. 4th. Other bodies act by altering the constitution of the odorant substance, producing new compounds either odorless or nearly so. Such is the action of moist chlorine or oxygenated water. 5th. Lastly, the action may be two-fold, as in the case of chlorine and ammonia, decomposing one portion and neutralizing the other without decomposition.

Neutralization includes the largest class of cases; thus the volatile odorous acids are neutralized by alkalies to form odorless salts. Ammonia loses its odor when united to an acid. The odors in such cases are truly neutralized, since displacing the acids liberates again the odors each in its own character. Examples of the destruction of odors are numerous and well known to chemists. Sulphydric acid, for instance, is at once decomposed by chlorine and consequently disinfected. Ammonia by the action of chlorine offers an example of both neutralization and destruction of odors, because at the same time we have decomposition of one part of the base and the neutralization of another part by the chlorohydric acid formed.

M. Chevreul proposes to define odors by means of a scale, analogous to our notation of sounds, or for gradations of color by the chromatic diagram (which last device we also owe to this *savant*). The great obstacle to this plan is the difficulty of employing the sense of smell as we employ that of sight or hearing, a difficulty much increased by the toleration which the smell soon acquires to odors—becoming ‘*blase*.’

In 1830 he endeavored to take account of the changing odors exhaled by the woad vats during evaporation, if possible to define exactly the kind of color appropriate to each condition of the vat. He reached no positive results, although he detected in the dye stuff bath *five* perfectly distinct odors; the odor of ammonia, a sulphurous odor, a metallic odor, an aromatic odor, clinging for many months to the wooden stuffs which had passed through the woad vat, and lastly, the odor of a volatile acid analogous to that of animal matters in decomposition. M. Chevreul hoped to detect in these odors of the dye vats symptoms to guide the dyer in his art, as the physician finds new indications in his knowledge of symptoms depending on the chemical nature of organic solids and liquids, if these symptoms can be certainly recognized by their odor. Thus he did not shrink from exposing himself to the most repulsive odors of the organism to reach his results. Having often heard the odor of a cancer spoken of as characteristic he examined it and recognized it to be a compound of—1st, an ammoniacal odor turning blue a reddened test paper. 2d, a feeble butyric odor. 3d, a heavy odor which is familiar in the ‘*trying out*’ of suet or lard. No specific odor exists then in cancers, since the three odors recognized coexist in *non-cancerous* matters which the disease alters. He recognized these matters in the odor of pus and other products of animal origin, and he also detected in them a sulphurous odor and a smell of fish, due probably to a compound ammonia.

To all these odors he adds what he calls the stale-nauseous (*fade nauseabonde*) which appears in well-water that has stood some days in a vessel in which have been placed egg shells impregnated with albumen.

[We may be permitted to add to these interesting facts some others which we submit to the distinguished author of the chromatic circle and researches on the fatty bodies.

1. If an odorous substance can be neutralized or destroyed by another odorant body there are others destitute of odor which by union produce odorant substances.

(To this class of odorless bodies belong O, S, Se, Te, C, H, As, Az, and we might add P, which is odorless unless combined.)

2. Likewise there are odorless bodies which have become odorant by union with others endowed with odor.

It is thus with oxalic, malic, butyric, racemic, citric, sorbic (the acid recently discovered by Hoffmann), boric, silicic acids, all odorless, which however produce with the elements of alcohol ethers more or less aromatic.

3. It is necessary to distinguish those bodies which act mechanically on the olfactory membranes (e. g., ClH, FlH, BrH, IH, and the vapors of $\text{NO}_3 + \text{HO}$, SO_3HO) from those which exert a physiological influence (for example, Cl, Br, I, NO_4 , SO_2 , the hydrocarbons, the essential oils, &c.)

4. It is necessary also to distinguish bodies having an odor proper, that is, an odor which exists when they form compounds with other bodies (for example, arsenic). The arsenical odor is recognized in AsH^3 , AsBr^3 , and in the cacodyl series. Tin is another example. The odor of tin characterizes a large number of stannic compounds. Sulphur: thus SO_2SH , S_2C , SNH_3 , SCl , &c., are distinguished by a more or less sulphurous odor.

We might also mention napthaline, benzoin, and other hydrocarbons and organic radicals.

We see that this group of bodies, characterized by a peculiar odor, embraces those elements which, like sulphur, arsenic and phosphorus, are destitute of odor, that is, their odor is manifest only in combination. If we examine those phenomena we observe (a) that elementary bodies are usually destitute of odor; (b) that in general the least odorant compounds are oxygen compounds; (c) highly odorant compounds are usually those containing hydrogen. These seemingly singular facts may to a certain extent be explained when we remember that in general chemical compounds become less volatile as they fix oxygen, while by union with hydrogen they become more volatile. But these considerations do not explain all; they do not tell us why CO and CO_2 are odorless gases, while C_{12}H , C_{26}H_5 , C_{12}H_5 , &c., &c., are odorant.

Moreover the perfumes properly so called, as musk and the aromatic essences, rose, lemon, orange, bergamot, lavender, &c. are eminently hydrogen compounds. They are not all volatile, and some of them may be exposed to the air for years, exhaling odor all the time, with no sensible loss of weight. Among these are perfumes isolated by Milon in 1856.* The cause of odors is not referable exclusively to the phenomena of volatility, although as a general thing the odor of most bodies is developed when they are volatilized.

Hydrogen must be considered, par excellence, the exciting cause of odors. This element possesses above all other substances the peculiar property of developing odors even with odorless bodies, as N, C, Se, Te, P, &c., and a great number of compounds, of these and other elements.

Oxygen, on the other hand, appears to act the chief part in the perception of odors; it seems indeed proved that odors are not recognizable where there is not oxygen in the air to bathe the olfactory membranes.]—*Am. Jour. Sci. and Arts*, Nov. 1859.

ON GALLIC AND GALLHUMIC (METAGALLIC) ACID.

By DR. F. MAHLA, Ph.D., Chicago.

It is mentioned among the reactions of gallic acid in almost every handbook of chemistry, that its solution produces a deep bluish-black color with a solution of the salts of the sesquioxyd of iron, which disappears when the solution is heated. As I have nowhere found an explanation of this fact, I have tried to investigate it by some experiments.

When the solutions of the sesquioxyd of iron and gallic acid are used in a diluted state, the resulting mixture appears only slightly colored; but if they are concentrated, it assumes, after being heated to ebullition, a dark brown tint, and then causes black spots on the skin, which can be washed away only with the greatest difficulty. Such a solution might perhaps be used advantageously as a hair dye.

If the iron-solution was not added in too large proportion, liquid ammonia no longer precipitates hydrated sesquioxyd of

**This Journal*, July, 1856, p. 109.

iron, but the proto-sesquioxyd (black oxyd). A reduction takes place, therefore, the oxygen transforming some of the carbon of the gallic acid into carbonic acid, which is freely evolved during the ebullition.

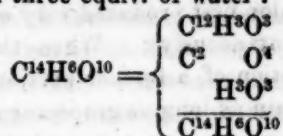
To a portion of gallic acid, dissolved in water and heated to ebullition, a solution of sesquichlorid of iron was carefully added in small quantities and the mixture heated again after each addition. This treatment was continued, until a drop of the solution mixed with a little water ceased to give the characteristic bluish-black precipitate of gallic acid with sesquichlorid of iron. A solution of carbonate of soda was then added in slight excess and the black precipitate separated by filtration. A portion of the filtered dark-brown liquor, after being exactly saturated with hydrochloric acid, deposited a voluminous black precipitate, which, if dried, formed a black shining mass, but when freshly precipitated, was easily redissolved by free muriatic acid. Such a solution, containing but little free muriatic acid, produced black insoluble precipitates with limewater, with the different salts of lime and baryta, with sulphate of zinc and sulphate of copper. Another portion of the filtered liquor super-saturated with acetic acid, caused precipitates of a black color in solutions of acetate of lead and nitrate of silver. From the silver precipitate, metallic silver was soon separated.

The lead precipitate was carefully washed with distilled water, and after being dried in an air-bath at a temperature not exceeding 200° F. (94° C.) for ten hours, it was heated over a spirit lamp, until the organic matter was perfectly destroyed. The residue, consisting of a mixture of oxyd of lead and metallic lead, was treated with acetic acid, and from it the whole quantity of oxyd of lead was calculated.

1.052 gram. gave 0.662 of the mixture of $PbO + Pb$, which left after being treated with acetic acid 0.037 metallic lead, a quantity corresponding to 0.041 oxyd of lead. The acetic acid extracted 0.625 oxyd of lead, which quantity added to the above found 0.041, gives 0.666. This is equal to 63.30 per cent.

Gallhumic (metagallic) acid, which was detected by Pelouse in the residue of distillation, when gallic acid was suddenly heated to 480° F. (249° C.) shows the same reactions, and its lead salt, $2PbO \cdot C^{12}H^3O^3$, contains 63.04 per cent of the oxyd

of lead. No doubt can therefore exist about the identity of Pelouze's acid and my product. The equivalents of gallic acid are divided exactly into one equiv. of gallhumic, two equiv. of carbonic acid, and three equiv. of water:



This origin of gallhumic acid forms another and interesting argument, that pyro-acids can be obtained otherwise than by the action of heat.

If some powdered "red precipitate" is added to a solution of gallic acid and heated over a spirit lamp, it is immediately reduced; gallic acid precipitates suboxyd of copper (red oxyd) in a solution of sulphate of copper; this reaction appears with the greatest facility if the solutions are heated together. It also reduces a cold solution of neutral chromate of potassa, producing the green sesquioxyd. The gallic acid is in each of these cases transformed into gallhumic acid. The action of these substances on gallic acid and the formation of the new product, is explained by assuming gallhumic acid to be only an intermediate product, the final result being carbonic acid and water.—*Am. Jour. of Sci. and Arts, Nov. 1859.*

ON THE DETERMINATION OF GRAPE-SUGAR, CANE-SUGAR AND DEXTRINE IN THEIR MIXTURES.

By J. G. GESTELE.

The analysis of a mixture containing grape-sugar, cane-sugar, and dextrine, or only two of these substances, is founded upon the following facts:—

1. A mixture of 1 part of ferridcyanide of postassium (the red prussiate) with half a part of hydrate of potash, dissolved in water, *has no action upon a pure solution of cane-sugar*, either at ordinary temperatures or when heated to boiling. An extraordinarily small quantity of this reagent *gives the fluid a strong yellow color*, and this color is persistent.
2. The same reagent applied to a solution of grape-sugar *loses*

its color very slowly in the cold, more rapidly between 122° and 140° F., but very rapidly between 140° and 176° F.

If a few drops of the solution of this reagent be poured into a solution of grape-sugar, heated to 140° F., and then well shaken, the yellow color first produced very soon disappears (at 176° F. almost instantaneously). When the coloration is reproduced by the addition of a further portion of the reagent, it always disappears again as long as grape-sugar is present. Towards the end, the decolorization takes place more slowly, and is then facilitated by heating the fluid to 176° F. If the fluid retains its color at this temperature, all the grape-sugar is destroyed.

The reagent is remarkably sensitive; the yellow color which persists at last in consequence of the addition of an excess of the reagent, may be removed by a few drops of grape-sugar.

3. *Dextrine*, prepared by roasting starch, *has no action* upon this reagent, even when it has been treated with muriatic acid under the same circumstances in which cane-sugar is converted into grape-sugar.

4. If a solution of cane-sugar in 40 times its weight of water, to which 55 per cent. of the weight of the sugar of concentrated muriatic acid has been added, be heated in the water-bath to 129°—131° F., all the cane-sugar is converted into grape-sugar. If this solution be then neutralized with carbonate of soda (an excess of which has no influence), it behaves like a solution of pure grape-sugar.

In order to apply these facts to the determination of grape-sugar, cane-sugar, and dextrine in their mixtures, it was first to be ascertained what quantity of ferridcyanide of potassium is necessary to decompose a certain weight of grape-sugar. Three experiments with a normal solution of ferridcyanide of potassium, proved that on an average it required 10,980 milligrms of the reagent for the decomposition of 1000 milligrms. of cane-sugar which had been converted into grape-sugar by means of muriatic acid, or 10,980 grms. of the salt to 1 grm. of cane-sugar.

A test-fluid was then prepared containing in 100 cubic centims. 10,980 grms. of ferridcyanide of postassium and 5½ grms.

of hydrate of potash. On the other hand, 1 grm. of sugar was dissolved in 40 cubic centims. of water, and 250 milligrms. of concentrated muriatic acid were added thereto; the mixture was then heated on the water-bath for ten minutes to 129°—131° F. This solution was then neutralized with carbonate of soda, and gradually mixed with the test-fluid; of this 99.7 cubic centims. were decolorized, so that the sugar contained 99.7 per cent. of cane-sugar. By the optical test, the same sugar gave an amount of 99.75 per cent. of cane-sugar.

Thus the reagent proved to be very accurate. Towards the close of the operation, indeed, a slight yellowish color made its appearance in consequence of the formation of a concentrated solution of ferrocyanide of potassium, but this is easily distinguished from that produced by $\frac{1}{10}$ th cubic centim. of the test-fluid. This coloration is scarcely perceptible when the sugar is dissolved in double the above quantity of water; and also in tests which required a smaller addition of the test-fluid.

To examine a *mixture of cane-sugar and grape-sugar*, exactly 1 grm. of it is to be weighed off and dissolved in 40 cubic centims. of water; the solution is heated to 158° F., and then $\frac{1}{10}$ th cubic centim. of the test-fluid is added from a graduated tube. If the color disappears immediately (as with the syrups), a considerable quantity of grape-sugar is present, and entire cubic centimetres may then be added, until the color slowly disappears at 158° F., when the addition of tenths of cubic centimetres is recommenced. If the color produced by the last addition does not disappear in 15—20 seconds when shaken, the operation is completed, and the amount of sugar is then read off directly, the portion of the test-fluid which was not decolorized being deducted. From the cane-sugar indicated, the grape-sugar is calculated in centesimal parts x according to the equation

$$171 : 180 = n \text{ cubic centimeters} : x.$$

If the decolorization does not take place from the commencement (as with refined sugars), no grape-sugar is present; if it takes place slowly (as with raw sugar), only a small quantity of grape-sugar is present, and the testing must then be carried on very carefully, as already described for the completion of the operation.

On the other hand, in order to determine the cane-sugar contained in the mixture, 1 grm. of the same sample is weighed off and dissolved in 40 cubic centims. of water; 250 milligrms. of concentrated muriatic acid are then added, and the mixture is heated in the water-bath for ten minutes to 129°—131° F.; when it has been neutralized with carbonate of soda, it is tested in the manner previously described. The per-cent-age of sugar is now found to be much greater than before, the cane-sugar being converted into grape-sugar. If the number of cubic centimetres of the test-fluid employed in the preceding test be deducted from the number now found, the difference gives the centesimal amount of cane-sugar.

The author found by experiments with mixtures of solutions of cane-sugar and grape-sugar, the amount of sugar contained in each being known, that they may be determined by the described process within $\frac{1}{10}$ th per cent. Of the organic acids which may occur in syrups, he only found two which, even when combined with potash, are decomposed by the test-fluid, and therefore decolorize it like sugar,—these are oxalic and tartaric acids; on the other hand, citric acid, succinic acid, and acetic acid have no action on the test-fluid.

This method of determining cane-sugar and grape-sugar evidently rests upon the same principal as Fehling's test for sugar; if the latter be arranged so as to correspond with that described by the author, it gives a larger amount of grape-sugar when dextrine is present; and the difference between the results of the two tests is to be ascribed to dextrine, so that it becomes possible to distinguish the cane-sugar, grape-sugar, and dextrine in a mixture by a volumetric process.—*London Chem. Gas. from Dingler's Polytechn. Journal*, clii. p. 68.

GLYCEROLE OF ALOES.

BY A. F. HASELDEN.

This preparation was originally introduced by M. Chausit, and subsequently by the General Apothecaries' Company, to the notice of the profession. Thinking it possible and probable that some of the readers of the *Pharmaceutical Journal* might meet

with or be questioned concerning it, without having any certain or definite acquaintance with it, I beg to offer the following brief account. Glycerole of Aloes, according to M. Chausit, is prepared by dissolving an alcoholic extract of aloes in glycerine. Upon this information, I have prepared some according to the following forms; the proportions are my own, not having any given with account of the preparation:—

Take of Socotrine Aloes, coarsely powd. and free from dirt, 3*iv.*
Rectified Spirit of wine, *3iv.*

Macerate until the aloes is dissolved, then filter through bibulous paper; distil the spirit as closely as may be, evaporate what remains to the consistence of treacle, and whilst still warm add sufficient pure glycerine to make four fluid ounces. Now, as the whole of the aloes, with the exception of a very small quantity of extraneous matter, was dissolved by the spirit and eventually mixed with the glycerine, reasoning from what I had already experienced with regard to the solvent power of that substance, I thought that it would possibly *alone* accomplish all that had already been done—that is, the solution of the aloes—but without the assistance of the spirit, and thus avoid a certain waste of material, loss of time, and needless labor. I therefore tried the following experiment:—

Take of Socotrine Aloes, in fine powder, *3iv.*
Pure Glycerine, *3iv.*

Mix them well in a mortar, then transfer to a bottle; agitate occasionally during several days, when, should the whole of the aloes not be dissolved, digest for fifteen minutes with gentle heat by means of a water-bath, when it will become dissolved, and may now be strained through linen to separate any small portions of dirt which may by any possibility be present. The result will be a preparation exactly similar to the preceding one, minus a very small quantity of spirit. Following either of these forms, only employing a larger proportion of aloes, a very similar article may be produced from the resin of aloes, which is obtained as a useless residue in preparing the aqueous extract of aloes. This glycerole of aloes is a bright mahogany-colored liquid, of the consistence of Price's best and pure glycerine, and has been recommended by M. Chausit in the treatment of

lichen agrius as an external application, also to the excoriations from *eczema*. It should be applied with a camel's hair brush.—*London Pharm. Journ. Dec. 1859.*

ON THE ARTIFICIAL FORMATION OF TARTARIC ACID.

BY PROFESSOR LIEBIG.

Professor Liebig has lately made the very interesting observation that tartaric acid is among the products of decomposition of sugar of milk by nitric acid. On examining the acid mother liquor, after the separation of mucic acid, he found among other constituents an organic acid, some of the salts of which, when analyzed, yielded results differing materially from the salts of the same bases with mucic acid, but agreed with the composition of the corresponding tartrates. A comparison between the latter and the salts obtained from the mother liquor, and the further examination of the isolated acid, proved the identity of this acid with tartaric acid. But besides the true tartaric acid, the mother liquor appears to contain another acid of the same composition, but somewhat different properties, probably a modification of tartaric acid. Professor Liebig is still occupied with the researches on this subject, and expects to be able soon to report his results.

To this preliminary notice it must be added that Professor Liebig tested the sugar of milk which he used, for tartaric acid, so as to remove all suspicion of the sugar having been accidentally contaminated with the acid.

This discovery of Liebig's is very interesting, as it appears to be the first observation of the artificial formation of tartaric acid. Professor Erdmann of Leipzig, in 1836, while studying the products of decomposition of sugar by nitric acid, for the purpose of investigating Guerin's hydroxalic acid, obtained an acid which, in accordance with his analyses, he took to be a modification of tartaric (metatarsaric) acid, and which, as he observed, was spontaneously converted into tartaric acid. (*Annales d. Pharm. xxxvi. 1.*) Subsequently, however, on investigating the same subject, H. Hess, of St. Petersburg, came to a different result, and declared Erdmann's metatarsaric acid to be

saccharic acid, (Ann. d. Ph. xxxvi. 1.) The artificial formation of tartaric acid has therefore been doubtful until Liebig's latest discovery.—*Buchner's N. Repertorium*, viii. 317, 318.

J. M. M.

ON THE EXPLOSION OF HYPOPHOSPHITE OF SODA.

By TROMMSDORFF.

Under the heading of "Caution," Dr. L. C. Marquart (*Arch. d. Ph.* lxxxv. 284,) describes a violent explosion of the above salt, while its solution was being evaporated in a porcelain capsule, placed in a heated sand-bath, for which reason too high a heat was assigned as the cause of explosion. It was, therefore, thought necessary to avoid evaporating such a solution, either over the fire or in a sand-bath, but to employ altogether a water-bath for its evaporation. This operation has been carried on very frequently, in my laboratory, without the occurrence of the least accident. But last spring, I experienced, by a painful accident, that even the low temperature of boiling water is no safeguard against explosions of this salt.

The neutral solution of hypophosphite of soda was evaporated in small portions in a porcelain dish, heated by a simple water-bath, the concentrated liquid being constantly stirred with a glass rod or a porcelain spatula. The last portion had become nearly dry, when a violent explosion took place, breaking all the windows of the laboratory, and seriously lacerating the face of the attending workman. Being near at hand, and supposing the explosion to have been caused by the neglect of the water-bath, I hurried to the spot, but found the bath filled with boiling water, and was unable to discover the least suspicious circumstance from which the cause of the accident might have been explained.

The preparation which I am using now, is of French manufacture, and has a strong alkaline reaction. Should it, in this state, be less subject to explosions? It would be highly interesting to hear of the experience of the French and other chemists, with regard to this new medicinal salt, which they are preparing in enormous quantities.

Archiv d. Pharm. 1859, Sept. 388.

J. M. M.

ON THE PURIFICATION OF SULPHURIC ACID FROM ARSENIC.

By C. FREDERKING, of Riga.

The statement which appeared in the Journals last year, that sulphuric acid may be entirely purified by heating it with chloride of sodium, recommends a process, apparently very easy, but which cannot be carried out in practice.

Sulphuric acid, when brought in contact with common salt or sal ammoniac, evolves much muriatic acid gas; one drachm of chloride of ammonium was therefore introduced into a small retort, together with 15 grs. arsenious acid and half oz. water, to which three oz. sulphuric acid were gradually added; muriatic acid gas was evolved, but not in very large quantity. Heat was now applied, and each half ounce of the distillate was tested for arsenic in Marsh's apparatus. The following was the result:

1st. The first half-ounce contained so much arsenic, that a metallic mirror was separated on the introduction of a zinc rod into the distillate.

2d. The second half-ounce contained yet chlorine and arsenic.

3d. The third and fourth half-ounces contained both in small proportion.

4th. The fifth half-ounce was free of chloride, and contained a minute quantity of arsenic.

5th. The residue of sulphuric acid, about one third of the original weight, held much arsenic in solution.

This behaviour may be explained in this way, that an excess of sulphuric acid prevents the formation of chloride of arsenic; it may even be easily proven, that the latter compound, when treated with concentrated sulphuric acid, is decomposed into muriatic and arsenious acids, the latter of which remains behind on distillation.

It is worth mentioning that I obtained English oil of vitriol (not the rectified) from a manufacturer of Moscow, which was free of arsenic, nitrous acid and lead, and left a residue consisting of the sulphate of potassa and of earthy matter.

In the "Archiv" for September, 1858, Neese proposes the distillation of sulphuric acid from a retort bedded in ashes; I can recommend this precaution from my own observations, inasmuch as I have been rectifying the acid in the manner indicated for the last twelve years.—*Archiv d. Pharm.* Aug. 1859.

Editorial Department.

OUR JOURNAL—This number commences the thirty-second volume of our Journal—the eighth of the third series; and it is with pleasure that we congratulate our readers on the large proportion and variety of original communications it offers for their acceptance. It is the wish of the editor to make its pages the recipient of original observations from all sections of the country. It is almost impossible to practise Pharmacy without observing something new, but comparatively few take the trouble to record their experience for the benefit of others. Our Pharmacopœia is about to be submitted to a new revision this year, by a committee to be appointed in May, 1860, by the convention at Washington. Every new fact bearing on the subject should be brought forward in time to influence their action, and we shall be glad to receive communications of that character. Will not our Southern friends give us some comments on their experience in regard to the permanence (or keeping) of syrups, fluid extracts, ointments, and other preparations liable to change by the heat of their southern latitudes, and what precautionary measures they find necessary in regard to them.

THE CHICAGO COLLEGE OF PHARMACY.—We have received in pamphlet form the "Constitution and By-laws, and list of officers and members of the Chicago College of Pharmacy," organized and incorporated May 5th, 1859. It was our intention to have noticed the establishment of this institution in our last number, but by accident omitted to do so. Now we are not only able to do this, but through the above pamphlet to speak from authority. We have also met with Dr. Scammon, the President of the College, and Professor of Pharmacy in the institution, who visited this city, and from whom we learn the earnest character of the effort of our Chicago brethren. That an association should be formed there, is no matter of wonder, but that within the short space of three months an institution should be founded, and a school of Pharmacy opened, under the direction of three professors, is certainly strong evidence of the energy and spirit of the members, who according to the pamphlet number forty-one. The Officers of the College are, F. Scammon, *President*; F. A. Bryan, *Vice-President*; J. D. Paine, *Secretary*, S. S. Bliss, *Treasurer*; with a Board of ten Trustees, having four standing committees.

The faculty consists of James V. Z. Blaney, M. D., Professor of Chemistry; F. Scammon, M. D., Professor of Pharmacy; John H. Rauch, M. D., Professor of Materia Medica. The lectures commenced November 9th, and continue three evenings in the week, for twenty weeks. Matriculation fee

\$2; Professors fees \$6 each; Diploma fee \$5. The terms of graduation are the same as those of the Philadelphia College of Pharmacy. We understand that a fair beginning has been made, and the effort has our warmest sympathy for its entire success. We would suggest to our Chicago friends to ground their prospects for the future mainly on the fact that their efforts *deserve* success, because they are *necessary and right*, and not because present enthusiasm burns brightly. There may come a period when this will cool with many, and it will need a few earnest united laborers to carry forward the College through such a discouraging season. Let them be prepared for this, and they will the sooner become firmly established.

POISONING BY SULPHATE OF MORPHIA.—It is with painful regret that we feel called upon to chronicle a case of poisoning by the accidental substitution of Sulphate of Morphia for Sulphate of Quinia, in a prescription for the latter substance, dispensed at the store of one of our most accomplished apothecaries, by which an estimable lady met an untimely death. It was alleged in the testimony before the Coroner's jury, that the prescription was for twenty-four grains of Sulphate of Quinia, in eight pills; that it was received at the store by the chief clerk, who, having read it, and being busily engaged himself, requested an apprentice to weigh the quantity of Quinia; that the apprentice took the Morphia bottle by mistake, although it was distinctly labelled (and checked by the word "poison,") and weighed out the narcotic, which in this manner came to be dispensed. These are the simple facts of the case. The clerk delegating the business of weighing the Quinia was amply qualified as regards knowledge, and a graduate in Pharmacy; the person executing that request had been a year in the store, and *a priori* would be presumed to be competent to perform so simple a service. But whether he erred from *absence of mind* or *carelessness*, or from *mistrust*, his unfitness for the task was proved by the result. Enough has been said to prove how vulnerable are the best regulated stores to the occurrence of accidents, and to demonstrate that nothing but sleepless vigilance on the part of disciplined and responsible persons can guard against these distressing events.

It is proper to reiterate on this occasion three simple rules, that if habitually followed would go far to guard against such errors in prescriptions.

1st. Whoever engages in dispensing a prescription, let him place the recipe before him, and concentrate his faculties upon it until it is clearly understood.

*2d. Let him never remove a substance from a bottle without reading the label upon it, and feeling satisfied that it indicates the medicine intended by the prescriber.**

* As there are so many synonyms for medicines, and physicians vary so often from the officinal names of the Pharmacopœia, the shop bottle and the prescription often disagree in the letter.

3d. Let the mental process of recognizing the contents, as being in accordance with the label, become intuitive by practice, and never omitted.

But whilst we realize the terrible effects of this accident in its relation to the sufferer and her friends, and increase our watchfulness lest it should, in a new phase, occur to some of us; let us not forget the sympathy which is due to the apothecary, who, wounded in his reputation and business, and his keen sensibilities harrowed by the untimely, and too often ungenerous remarks of the unthinking public, finds the nine hundred and ninety-nine instances of careful and highly responsible service have been forgotten, if the thousandth falls short.

Proceedings of the American Pharmaceutical Association at the Eighth Annual Meeting held in Boston, Massachusetts, Sept. 1859; with the Constitution and Roll of Members. Boston. Press of Geo. C. Rand and Avery, 1859. Pp. 406, octavo.

It is with no small degree of pleasure that we receive the "Proceedings," after a somewhat unusual delay in their issue, arising out of the want of punctuality of members in returning their MSS. to the Executive Committee. In number of pages it falls considerably short of the volume for 1858, but this arises from the fact that the last 150 pages which include the special reports and volunteer papers, are printed in small type, each page of which is equal to two of the usual type. In its typography this volume compares favorably with all that have preceded it, and the paper is excellent. So much for the physique of the volume. As regards its contents much may be said. In a prefatory note, the Executive Committee go into an explanation of the cause of delay, and suggest a remedy, for the benefit of future publishing committees, in the following resolution:

"Resolved, That the Executive Committee receive from the hands of the Secretary on the last day of the session, all papers and manuscripts, with the minutes of the meeting, referred to them for publication, said manuscripts to be fairly and legibly written, and in proper state to be given to the printers; all manuscripts and papers not so delivered to be excluded from the printed report, unless delay be granted by a special vote of the Association."

This resolution, if passed at the next meeting, would be too late for the papers presented at that meeting, all of which will be prepared before it convenes: and as to the Secretary's minutes, they cannot be *properly* made out from sitting to sitting, and are much more likely to be correct if they are carefully examined and copied after the meeting, especially in reference to the accuracy of names. Nevertheless, we approve of its suggestion, and believe that it will induce the contributors to the meeting for 1860 to give more care in the preparation of their manuscripts.

Forty-eight pages are occupied with the minutes of the meeting as

furnished by the Recording Secretary which include the President's address, the Executive Committee's report, and the list of subjects for future investigation. The Report on the Progress of Pharmacy occupies sixty six pages, and consists chiefly of succinct notes of discoveries and improvements in chemistry, *materia medica*, pharmacy, etc., with references to authorities, etc., which will prove useful to investigators. This paper would have been much more accessible if the committee had appended an alphabetical index to the work like that in the volume for 1858.

The Report on Weights and Measures, by Alfred B. Taylor, is the most elaborate document yet published by the Association, and is calculated to excite considerable interest beyond the precincts of the Association, from the wide scope of its researches and the novelty of its suggestions. Deeply impressed with the grave importance that attaches to any change in national customs so deeply seated as are those connected with weights and measures, the author has hesitated in urging any present change, especially as the substitutes for our present system, which have been brought forward, possess objections that render them far from perfect, including the French decimal system. The proposed alterations of the troy grain to suit the new division of the avoirdupois ounce, as adopted by the present revisers of the British Pharmacopeia, does not meet with approval, the sacrifice being greater than the benefits. The report enters into historical details of great interest, indicative of much research and thought, in reference to the various arithmetical scales that have been proposed, and especially that of the Hindoos, or our decimal system, attributed commonly to the Arabs. At this point the report takes the bold step of suggesting the adoption of the Octonary scale of enumeration with an entirely new set of characters; 8 taking the place of 10, 64 of 100, and 512 of 1000, etc. The eight primary numbers or digits he calls *un*, *du*, *the*, *fo*, *pa*, *se* and *ki*; *unity* is 8, *under* 64, *untyder* 512, *unsen* 4096, *untyesen* 32768, *undersen* 262144, *untydersen* 2097152, *unkaly* or the eighth power of eight, equal to 16,777216 and so on. This octaval method is carried out in all the tables of calculation and value for weight, measures, time, length, capacity, area, etc., and in the opinion of the author presents advantages in the simplification and facilitation of calculations of the highest value to commerce and science, and worthy the effort required and inconveniences occasioned, to substitute it for the present decimal system.

The author assumes the equatorial circumference of the earth to be a more accurate and reliable basis of calculation than the meridian as adopted in the decimal system, and he has taken the *unkaly* part of the sextant of that circumference which amounts to 15 $\frac{1}{2}$ inches as the unit of linear measure and calls it a *module*. The content of a cubic module is adopted as the bushel or *modius* which is the standard of measures of capacity. This measure will contain 139 pounds, and 104.7 grs. of distilled water at 39 $\frac{1}{2}$ Fahr. We give below the two tables of weights, and measures of capacity.

Table of capacity measure.

Minim.	
8 minimis	make 1 morsel.
8 morsels	" 1 ligule.
8 ligules	" 1 cup.
8 cups	" 1 gill.
8 gills	" 1 pint.
8 pints	" 1 gallon.
8 gallons	" 1 modius.
8 modiuses	" 1 butt.
8 butts	" 1 cord.
8 cords	" 1 vat.

Table of weights.

		grm.
8 mites	1 mite,	= 0.464
8 grains	1 grain.	= 3.712
8 scraps	1 scrap, or 3,	= 29.696
8 drams	1 dram,	Avg. $\frac{1}{2}$ oz. & 18.824
8 ounces	1 libra or lb,	= 2 lb 2 " 329.760
8 libras	1 stone,	= 17 " 6 " 13.080
8 stones	1 pondus or wt.	= 139 " 0 " 104.700
8 pond's.	1 load,	= 1112 " 1 " 400.000
8 loads	1 ton,	= 8896 " 15 " 138.
8 tons	1 keel,	= 71175 " 10 " 220.

We must here leave the report, and whilst granting the superior advantages arising in practice from an *octaval* enumeration, we look upon the views of the report as involving changes so radical as to wholly prevent their adoption in practice. We suggest to our readers to recur to the subject as presented in full in the Proceedings of the Association and give it a careful perusal.

The Report on the Revision of the Pharmacopœia is not the document that should have issued from the Association just prior to the decennial revision. It is not positive and definite enough, and does not come with that authority which should characterize the action of the second annual committee of a national body; nevertheless it contains many valuable suggestions, and we recommend it to the attention of the revising committees.

The Report on Home Adulterations has been already given in full to our readers in the November number; as also the special report on Fluid Extracts which follows it.

Of the other special reports and papers, the more important are,

Dr. Battey's report on Sorghum saccharatum.

J. M. Maisch on the active principle of *Cornus Florida*.

J. M. Maisch on the behaviour of essential oils to iodine and bromine.

Dr. Squibb on the officinal preparations of metallic mercury.

F. F. Mayer on iodide of iron, and the tests for iodine.

Dr. W. H. Pile on the specific gravity of water at different temperatures.

Henry A. Tilden on the therapeutic value of foreign and indigenous medicinal plants. The last is a paper worthy of the attention of pharmacists, and chemists. The first part is directed to the influence of culture on the composition of Belladonna, *Hyoscyamus*, *Aconite*, *Conium* and *Digitalis*, taken in connection with the use of ordinary manure, guano, nitrate of potassa, and nitrate of soda. The analyses in connection with the experiments on culture are sufficiently definite as regards the inorganic constituents; but in relation to the alkaloids, nothing can be learned from them, inasmuch as the "alkaline substance" was not pure, as much as 20 to 25 per cent. of it being obtained from the plant. As the whole value

of the experiments depended on the accurate isolation of these active principles, they fail to convey the information sought by the author.

The conclusion of the paper consists of an outline of a plan of proximate analysis followed by tabular statements of the quantitative analysis of twenty-six drugs, chiefly of our native plants, which must have involved a large amount of labor to the chemist who executed them; unaccompanied as they are by the details of the several analyses, and with a description of the active principles, it is difficult to form a correct opinion of their merit for accuracy.

We give a transcript of the composition of mandrake.

Mandrake root (*Podophyllum peltatum*.)

	Collected in April.	Collected in October.
Organic matter,	90.857	90.857
Inorganic matter,	9.143	9.143
	100.000	100.000
Gum and Albumen,	8.857	6.854
Starch,	6.057	8.121
Extractive matter,	7.571	3.897
Bitter principle,	11.828	10.882
Resin, soluble in alcohol and ether,	2.857	5.117
Resin soluble in alcohol, insoluble in ether,	2.400	0.571
Soluble salts,	1.072	2.490
Insoluble salts,	8.070	6.652
Lignin, &c.,	51.288	55.416

The points which deserve attention in this analysis, are—1st, the existence of a large amount of “bitter principle.” 2d, the greater development of the resin soluble in ether in the autumn, and the diminution of that insoluble in ether at the same period. This will account for some of the discrepancies of writers on this subject. What the bitter principle is we have no means of determining from the analysis.

The Appendix to the Proceedings consists of correspondence furnished by the U. S. Patent Office, in relation to cinchona bark, and some indigenous medical productions of the Indian Territory, followed by the constitution and list of members.

In concluding this notice, we would suggest to members of the Association, in order to assist the executive committee in their financial matters, that they not only pay up all their dues, but that such as feel able should buy several copies of the Proceedings and dispose of them to pharmacists who are not members, and thus create an interest in the Association beyond its precincts. The price of the work is only \$1.00 per copy, or \$1.25 postage paid. Five dollars will therefore procure four copies by post, or five copies by a private medium.

CATALOGUE OF THE CLASS OF THE PHILADELPHIA COLLEGE OF PHARMACY.
FOR THE THIRTY-NINTH SESSION, 1859-60.

With a List of their Preceptors and Localities.

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